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THE MILITARY SURGEON

JOURNAL OF THE
ASSOCIATION OF MILITARY SURGEONS
OF THE UNITED STATES

EDITED BY
JOHN VAN R. HOFF

VOLUME XL

WASHINGTON, D. C.
THE ASSOCIATION OF MILITARY SURGEONS
OF THE UNITED STATES
1917

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PUBLISHED BY THE
ASSOCIATION OF MILITARY SURGEONS
OF THE UNITED STATES
ARMY MEDICAL MUSEUM, WASHINGTON, D. C.

JANUARY, 1917

VOL. XL NUMBER 1

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The Military Surgeon

Published monthly and constituting two volumes annually.
Volumes commence with the January and July numbers.

Entered as second-class matter January 22, 1916, in the Postoffice at Washington, D. C., under the Act of March 3, 1879.

Subscriptions $3.50 a year for the United States. Elsewhere throughout the world, $4.00. Single copies 40 cents. Subscriptions payable in advance. Checks should be made payable to the Association of Military Surgeons and not to any officer personally.

The addresses of members and subscribers are not changed except upon request. In every case the old as well as the new address should be given. Requests for change of address must reach the Secretary before the twentieth of the month to be effective for the following issue.

Original articles, items of news and matter of interest to the Services are welcomed. Requests for reprints should be made at the time of forwarding articles.

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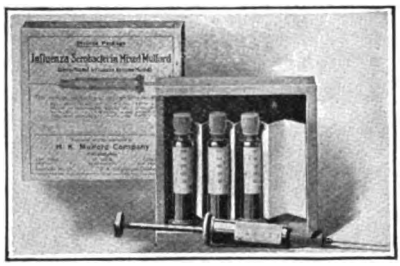

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THE
MILITARY SURGEON

VOL. XL JANUARY, 1917 NUMBER 1

ORIGINAL ARTICLES

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THE ADVANTAGES OF MILITARY TRAINING FOR YOUNG MEN[1]

BY COLONEL WILLIAM H. ARTHUR
Medical Corps, U. S. Army

THE title of the paper I was asked to read is "The Physical Cultural Value of the Preparedness Movement." Even yet the "preparedness movement" is still in the discussion stage, and includes many more or less futile and some very absurd schemes for making ready for national defense. Any effort in this direction is being vigorously opposed by many determined and loquacious orators. Under these conditions the only physical cultural value of the movement is the increase by exercise, of the lung power of the contestants.

If, however, by "preparedness movement" is meant the enforcement of general compulsory military training for our young men, which many men well qualified to judge consider the only efficient means of providing an adequate force of trained men for national defense, I am convinced that in time such a movement would result in a very material physical improvement of the men of our country. Assuming then that this is what was intended, I have given this necessarily short, and I am afraid desultory, paper the title of "Advantages of military training, generally applied, to young men," and these advantages are by no means confined to improvement in physique, important as that is, for there are many other things a young man gets out of military training, which I shall speak of even though they may seem not directly connected with the main subject. The idea of general military training, even of compulsory military service, in this country is not a new one. In a letter written from Monticello, dated July 18, 1813, Thomas Jefferson, ex-president, writing to James Monroe, then Secretary of State in the cabinet of President Madison, in a reply to a letter from the latter, uses language which shows that both of these distinguished American statesmen foresaw the necessity of, and advocated both

[1]Read before the College of Physicians of Philadelphia.

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universal military training and compulsory military service. Mr. Jefferson says, referring to Monroe's letter:

"Every line of it is replete with wisdom, and proves the necessity of obliging every citizen to be a soldier. This was the case with the Greeks and Romans, and must be that of every free state. We must train and classify the whole of our male citizens and make military instruction a regular part of collegiate education. We can never be safe until this is done."

In the many voluminous articles we read these days on preparedness, the many more or less futile schemes that have been proposed to enable the country to elaborate a military reserve to be called out in case of necessity, the fact that systematic military training for growing young men is an excellent thing in itself, a very valuable part of the education of a boy, seems to have been lost sight of. There can be no doubt that there are many and great advantages to be gained by putting all young men who are not mentally or physically disqualified through a course of military training—advantages I mean to the young men themselves, even if they were never called on to do duty as soldiers in the field, though, of course, it would be of enormous value to the country to have within call a large body of potential soldiers.

Compulsory general military training so dreaded and so denounced, and so often characterized by that most frightful of adjectives "un-American," would be, I believe, an excellent thing for our young men and a very valuable part of their education; would make them better men, physically, mentally, and morally; better citizens, more efficient workmen, business men, and professional men.

We live in a veritable riot of individualism. The average American recognizes no duty to the state, and the average boy is brought up to believe that making money, without working for it, keeping out of jail, and consulting his own comfort and inclinations are the only things worth considering.

Observe a gathering of young Americans, hear them talk, and notice their frequently poor physique, their cigarette-stained fingers, their loose-jointed, slack-twisted appearance, their awkward gait; go to a baseball game and sit among the bleachers and note the appearance and manners of the young men and boys you see. You will not come away favorably impressed with young American manhood. And yet it is good material—excellent stuff out of which good men can be made. Inculcate into these young men some sense of duty to the state, some respect for constituted authority, based not on fear of the police but on reason and a realization of its necessity for the common good; feed them properly, give them systematic physical

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training, teach them discipline, self-control—in short give them a period of military training with all that it implies. Can you doubt that it would make them all-round better men? Can you think of any better method of educating them for useful citizenship? Compare the graduating classes at West Point, Annapolis, or the Virginia Military Institute with the classes at other colleges, where, if there is any military drill and training, it is desultory, not a matter of much interest to the faculty and is gone through more or less perfunctorily. The difference is, I assure you, very manifest.

Athletics as practiced at schools, colleges, and universities does not produce large numbers of symmetrically trained men. The tendency is to select a few, train them intensively in certain athletic specialties (often overtraining them to their permanent physical detriment), while the great mass of students exercise only their lungs in inciting their selected athletes to further efforts.

It may seem irrelevant to discuss advantages other than physical that result from military training, but it may be safely asserted that they are many and that they form a very valuable part of the education of a citizen. I doubt if there are in any civilized country in the world, as in ours, so many young men who grow up in a spirit of practical lawlessness; who have no idea of obedience, respect for constituted authority, or the most rudimentary conception of what is called discipline. They know or care nothing of the value of team work, the enormously increased efficiency of a mass of trained men working smoothly together to accomplish a definite object, over the same number of men just as willing and anxious to do good work but unaccustomed to working under discipline, without system, each man acting on his own initiative. This can best be taught by a period of military training, and makes the difference between an army and an armed mob.

The value of this kind of training was well illustrated after the earthquake and fire in San Francisco in 1906, and later in the disastrous floods in the middle west, and on many other occasions when the rescue work was non-military, but when small bodies of trained soldiers proved much more effective than much larger bodies of untrained men, no matter how strong and willing the latter might be. In Mexico today the civilian truck drivers managing motor trucks, and used to dealing with untrained men, express the greatest surprise at and admiration for the efficiency of the trained soldier, when called on to assist them, as compared with civilian help. Will not the average young man who has undergone say a year of this kind of training be a better workman, farmer, lawyer, architect, or doctor, for the experience? I believe he will. He will be a man of better physique for it. He will

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have learned something of personal hygiene, developed habits of cleanliness, order, system, punctuality, as well as the habit of instinctively subordinating his own inclinations to the general welfare. He will have led an open air life, have been judiciously exercised, given abundant, simple but properly selected and prepared food, carefully calculated to produce the maximum benefit. The average American family is not judiciously fed, and in this one matter of diet alone the military training will be of value in building up the young man in barracks or camp. The average American kitchen is more notable for waste of material than for good cooking. There was a vague idea when our troops occupied the Philippines that the natives had by long experience reached the ideal diet for the tropics, and that a diet of rice, fruit, and fish, on which the lower class Filipino largely subsists, was the proper ration for hot climates. The fact was that the natives lived on this diet because it was all they could easily get. When they enlisted as scouts and were given a much more generous diet (to which they took very kindly indeed) combined with exercise, they improved rapidly and very markedly in weight, muscular strength, and endurance, and became physically much more vigorous men than their brothers who did not enlist.

Can there be any doubt that such a well-balanced diet as the soldier's ration affords, combined with outdoor life, active exercise carefully calculated to develop the entire body, and not carried to excess, would be of enormous benefit to the growing young man?

If you could see, as I have in many thousand cases, the round-shouldered, shambling, awkward recruit brace up, and in a few weeks of setting-up exercises become a straight, upstanding, alert young soldier, you would, I am sure, agree with me that it was well worth while. The young man has by that time developed a certain degree of self-respect; he has had aroused in him the spirit of emulation and a desire to present as good an appearance as the best of his comrades. Incidentally he has learned what I believe is an excellent lesson for the average young man—not to take himself too seriously: that is, he has acquired a sense of proportion, a realization of the relative value and importance of people and things—a very valuable item in the education of any man.

Undue conceit is not popular and cannot long survive in the barracks, and, if the recruit is inclined to over-estimate his own qualifications or exaggerate his own importance, he soon reaches his proper level under the not too subtle badinage of the barracks. A little ridicule is a potent factor in bringing young men into line, and it is a healthy influence in the life of the young soldier. I have seen this method applied in a

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large private school for boys with excellent effect in enforcing discipline.

But we are now principally concerned with the beneficial effect of military training on the physique of young men. To get the best effects we should get very young men, preferably from eighteen to twenty, but preliminary physical training should be begun even earlier, say at fourteen.

The Boy Scout movement has demonstrated very well the excellent effect of even desultory physical training for young boys. The quasi-military features of this organization attracts the boys; the "gang spirit" present in all normal boys is turned into useful channels and utilized as team work. The hikes and camping parties combine a pleasant, interesting occupation with instruction of a very valuable kind and outdoor exercise, and the boys develop physically under conditions that to many of them would be unattainable except for the Boy Scout movement. It is certainly a step in the right direction.

One of the evidences of physical improvement as the result of military training that it is difficult to measure or prove by statistics, but which is nevertheless an actual and important result, is the increased resistance to the inroads of infectious diseases that is developed by judicious military training. I can illustrate this by my own experience during the Spanish-American War. I was in command of a hospital ship and was ordered to Santiago, Havana, and Porto Rican ports, and Manila, to bring home the débris of the forces engaged in those countries. The principal morbidity was from typhoid fever, and we carried a great many patients, many of whom died at sea. Those who succumbed were almost invariably volunteers or raw recruits for the Regular Army, while practically all the older soldiers recovered. This was so well recognized by the surgeons on duty in the wards that a bad prognosis was given whenever it was found that the patient had had little or no military training. The unfortunate lads, enlisted only a few weeks before, when there had been no time for physical training, had much less resistance than the better seasoned soldiers. That, too, explains the very high mortality rate in the volunteer camps in the United States. If these camps had been occupied by trained soldiers, used to taking care of themselves in camp, hardened by physical training, the mortality would certainly have been lower, probably very much lower.

The idea of compulsory general military training seems to be abhorrent to the American and English people, but does it not seem that the state has as much right to demand of its citizens protection from invasion as to call on them to pay taxes to defray the government's expenses? No one is *asked* to pay taxes. He is forced to do it. He is not asked

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if he wants to, for the answer to that question would be an emphatic "No." But we are again straying from the subject of the physical improvement to be expected from military training. So many things are of interest in this connection that it is difficult to keep to the beaten track.

The subject of the physical development under systematic training of the recruit has been studied by medical officers of the armies of all nations, and the same training that produces such good results in the more mature recruits should do even more for younger men, who are still growing and who have not yet reached a stationary period of physical development. Of course there must be a firm foundation on which to build, and careful physical examinations must be made to exclude young men who are permanently disabled mentally or physically, but it is surprising to see the rapid improvement under systematic training and good feeding of men classed as "under weight for height," "poorly nourished," "poor muscular development," "anemic," etc., etc., but who show no evidence of serious definite organic disease, or who are not crippled.

Previous hard manual labor is by no means an equivalent for judicious physical training. It may develop one set of muscles at the expense of others, and it may take time and special gymnastic exercises to eliminate the muscular asymmetries produced by some occupations. Under training the man becomes straighter, chest capacity increases, he gains weight, and his muscles increase in volume and improve in tone. Or, if there is a tendency to obesity, the fat disappears and the whole physique improves. Rossignol, writing of recruits for the French Army, says: "Young men whom one would consider too weak to endure the hardships incident to military life acquire after six months' military training a general development of the body we should scarcely be bold enough to hope for, and become, under the influence of exercise, strong and robust soldiers." When physical training is properly carried out, men are educated to act with cohesion, rapidity, and accuracy, each soldier having his individualism developed and his intelligence sharpened; individual serviceability is increased. A late superintendent of West Point reports that the physical tests and measurements of cadets showed very marked gains at the end of the first year—gains in weight, chest capacity, and muscular measurements, and also in practical tests of strength on the horizontal and parallel bars and broad jump.

Medical Director Beyer, of the Navy, made a series of observations on the cadets at the Naval Academy. The system of records at the Naval Academy made it possible to compare the physical development of the cadets before and after the establishment of systematic physical

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training. He found, as the result of this training, a very marked increase in lung capacity, and even in the height of the cadets, but, as these boys averaged only 18½ years of age, the increase in height, as they had not all ceased growing naturally, can scarcely be attributed to the training. In other respects, however, the improvement in physique was very marked after the establishment of systematic training.

According to an English medical officer, out of 15,504 British soldiers who completed a course of three months' physical training in 1887 in the military gymnasia of the United Kingdom, the average increase was in weight, 2½ pounds; chest measurement, 1¼ inches; forearm, ½ inch; upper arm, ¾ inch; thus accomplishing in three months a very marked physical improvement. And these soldiers were all mature men. Even better results can be expected if the training is given younger men or boys. At one time twelve noncommissioned officers of the British Army, selected from infantry, cavalry, and artillery, were sent to McLaren, an English army surgeon who made a study of physical development. These men ranged from 19 to 29 years of age, 65 to 72 inches in height, and from 128 to 172 pounds in weight. As the result of three months' training he says: "The muscular additions to arms and shoulders were so great that by the fourth month the men could not wear the tunics that had fitted them easily before, and new clothing had to be issued to them. One of these men gained 4 inches in chest measurement. All increased in weight, the average being 10 pounds gain. One gained 16 pounds in less than four months, and this gain was not in fat, but in muscle increase." McLaren adds: "But the greatest of all changes, which cannot be recorded in figures, was the great improvement in bodily activity, dexterity, mental alertness, and endurance to fatigue, a change a hundred times more impressive than any that can be shown by tape line or weighing chair." This is a fair illustration of what can be accomplished in a very short time by judicious physical training in men averaging 24 years of age. With younger men and longer training it will be, and always has been, even better.

I have in thirty-five years' experience in the Army, seen many thousand young men develop under military training from round-shouldered, untidy, shambling, awkward boys with flabby muscles and pasty complexions, into well-set-up, clean, alert, active young soldiers, after a few months of setting-up exercises and squad and company drill. Six months of this training can work physical wonders on rather unpromising material. As Col. Woodhull of our own service expresses it: "As a consequence of efficient military hygiene, which involves mental and moral as well as physical training, the average

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recruit is a far better man at the end of his term of enlistment than he was at the beginning, if there is any discipline worthy of the name in his company. He has learned obedience, promptness, responsibility, order, the value of coöperation, the importance of cleanliness and regular habits, and proper physical exercise, all important elements in the education of any young man."

Another faculty developed by the associations of military life is physical courage, or at least the excellent imitation of it that is engendered by a frame of mind in which a man is much more afraid of his comrades' contempt than of the enemy's fire. A spirit of manly resolution, cheerful endurance of physical discomforts and even hardships are certainly most important attributes for any man, and these are part of the unconsciously acquired qualities of a soldier, and develop *pari passu* with his physical improvement under military conditions and training. Another faculty he acquires is promptness in deciding the proper action to take in time of emergency.

I believe, then, that a systematic course of military training throughout the country, widely applied and given practically to all healthy young American men, would result not only in the general physical improvement of the race, but in very valuable character building.

Time will not permit, nor is it necessary to go into minute details of the actual exercises of the recruit, but the results have amply justified the time, study, and effort spent on them, and the military surgeons of all civilized nations agree as to their great value. Military training, generally applied, has made of the Germans most efficient workmen, mechanics, business and professional men, and the Swiss training has resulted in the development of one of the most vigorous and generally efficient races of Europe. I do not believe that, leaving out of consideration entirely its value from a military standpoint, any better method for the physical improvement of the race could be devised than to require a year of military training of all able-bodied adolescent American men, and as a part of their education it would be of inestimable value. The time could not be more profitably spent. It would start them in life with a knowledge of, an instinct for, personal hygiene; physical, mental, and moral training; and would be a means of inculcating habits of life and modes of thought and action that would help to make them strong, self-reliant, and efficient citizens. Even if we were absolutely secure from international complications and should never need a soldier in the uniform of the United States, general military training would do much, I believe, toward the physical and general betterment of the race. As, unfortunately, we are not entirely secure in our isolation, and may be said to live in a fool's paradise, located on the edge of a very active

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volcano, we would kill two birds with one stone by making our young men more efficient citizens, improving the average physique and general efficiency of the race, at the same time providing a large mass of men trained, to some extent at least, to be of value for national defense.

As the result of military training young men return to their homes with strong and healthy bodies. Statistics show that their children are healthier than those of men who have not had training.

They take with them habits of orderliness, cleanliness, precision, alertness of mind, and concentration of attention. They acquire the habit of discipline. When they return to civil life these habits are fixed parts of their character.

A discharge from the service with character "excellent" is a very valuable recommendation for a man, and will in many places secure him prompt and lucrative employment.

One of our national weaknesses is that we are all too much given to consulting our own individual comfort, interests, and convenience. We are all like Artemus Ward, who was perfectly willing to sacrifice his wife's relations on his country's altar.

Nobody wants his or her son to be taken away from school or from some lucrative occupation and sent into barracks or camp for a year, but he or she is quite indignant that the neighbors do not see their plain duty and send their badly brought up sons to spend a year in military training.

If the American people could only be brought to a realization of the fact that they owe something, a great deal, to their country, that their private wishes and inclinations must give way to the interests of the state, the general welfare, something might be accomplished; but anything an American is called on to do that he doesn't want to do is an invasion of his sacred liberty and arouses at once fierce opposition. How long will this liberty last if no one is prepared to defend it, and what better preparation can be made than to train up our young men to be able to do their part when trouble comes, incidentally giving them a most valuable physical, mental, and moral education that will make them sounder, stronger, more efficient citizens, even if, as we all fervently pray, the day of wrath is indefinitely postponed? It is a safe and cheap form of insurance in which the policy holder is also the beneficiary, a cheap and valuable method of education that would result in a very material betterment of the race, at the same time securing a military reserve of incalculable value, if it is ever needed—and what man can say when that may be?

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THE PRESENT SYSTEM OF RECRUITING FOR THE U. S. NAVY AND MARINE CORPS

By Surgeon MIDDLETON STUART ELLIOTT
U. S. Navy, Navy Recruiting Station, New York

THIS paper is presented with the idea of informing the service, and particularly the medical officers, how recruits are obtained. Among the misinformed the impression is more or less prevalent that all that is necessary to obtain men for the service is to go to a city or town, open an office, perhaps hand out a few posters and put a card or two in the papers and sit back and wait for patriotic applicants to fall over themselves in applying for jobs in the Navy or Marine Corps. Nothing is further from actual conditions. As recruiting is now being developed it is becoming a scientific commercial proposition, following well-known methods and principles adapted in up-to-the-minute advertising.

It is not necessary to describe the older methods of obtaining recruits, which were effective to a certain degree. With the expansion of all arms of the services, the Navy Department recognized the need of a vigorous and efficient campaign to obtain recruits and with that end in view establishedin August, 1915, the Eastern Recruiting District, which included the New England States, New York, New Jersey, Pennsylvania, Delaware and Maryland. In January, 1916, all the territory lying east of the western boundry of North Dakota, South Dakota, Kansas, Oklahoma, Nebraska, and east of 103° west longitude in Texas. A Western Recruiting District, including all States west of the above-mentioned area, was also established.

Each district is directly under the charge of an officer who is the publicity officer for the district. Headquarters for the Eastern District is in New York City and for the Western District in Indianapolis. The officer in charge of the district has general supervision over the whole district, and all reports, returns and information are sent to and through the publicity bureau. He is also the inspecting officer for the district, and all efficiency reports on recruiting personnel are referred to and acted on by him. The object of dividing the country into districts and placing them under senior line officers was to coördinate the work—systematize methods of recruiting and publicity and to have a responsible head through whom the Navy Department could stimulate the recruiting stations.

The recruiting system is organized as follows: Navy Department Bureau Navigation, Division of Enlisted Personnel; Eastern Recruiting

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District, Western Recruiting District, each under charge of a senior line officer; Main recruiting stations; Recruiting sub-stations.

The main recruiting stations are located in large cities, there being forty in the Eastern District and ten in the Western District. The number of sub-stations vary from none to ten, the total number being approximately 100. In locating main stations the locality is thoroughly worked out as to population, facilities of transportation, surburban and rural population, manufacturing and labor conditions. All these are taken into consideration before deciding on the location of the main station. The sub-stations are located so as to cover the surrounding territory and feed the main station with applicants as fully as possible. In locating main stations in large cities the busiest part of the city is selected, the transportation facilities being always kept in view.

Recruiting duty under the Marine Corps is carried out in similar manner. The Publicity Bureau is located in New York under the charge of a line officer who has complete management of the publicity work.

The country is divided into the Eastern Recruiting Division with headquarters at Philadelphia, the Central Recruiting Division with headquarters at Chicago, and the Western Recruiting Division with headquarters at San Francisco. Each division is in charge of a major and the main stations are in charge of officers of lesser rank. In some localities there are feeders for the main stations in the form of flag stations and traveling parties. One of the essential differences in publicity methods between the Navy and Marine Corps is that in the former the officer in charge is also the inspecting officer and looks after many details of recruiting which could be done by recruiting officers. The officer in charge of Marine Corps publicity has nothing to do with the details of recruiting; all his energies and work of the bureau are directed solely to publicity work.

Each publicity bureau has installed a large modern printing plant with many labor saving machines, which is capable of turning out high-class work, including color processes.

The personnel consists of enlisted men particularly equipped for such work and selected with this end in view.

Upon the establishment of the present system of publicity, the recruiting station in New York and publicity bureau were separated; up to this time the recruiting officer was also in charge of the publicity bureau.

The publicity work for the Marine Corps has been of longer duration, but the methods of the two services are similar in many respects.

The personnel of the Navy Publicity Bureau consists of an officer

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in charge, an assistant, a paymaster and enlisted personnel of approximately fifty men, the majority of whom are chief petty officers and petty officers. Formerly men who were detailed for recruiting duty were selected as a reward for long sea service, but this no longer obtains; he must have other qualifications, he must be a hustler and must show he is specially qualified for the work, and if he is not he is sent back to sea. In detailing men for the publicity bureau their peculiar qualifications are considered, such as printers, linotype operators, etc.

The personnel of the Publicity Bureau for the Western Recruiting District at Indianapolis consists of an officer in charge, with approximately twenty-seven enlisted men. The work done at this station is not so extensive as that done at New York, all posters, signs and outside advertising matter being prepared in the New York Bureau.

The personnel of the Marine Publicity Bureau consists of an officer in charge with enlisted personnel of twenty-three men. All advertising matter for the Marine Corps is done at this office.

The scope of present publicity methods, both in the Navy and Marine Corps, is briefly set forth by the following: A mailing list of approximately a million names in the Navy Publicity Bureau of possible applicants who may wish to enlist. The names are circularized from time to time, usually about once a month. The names are divided into "First series" and "Star" mailing list, which are of those who have answered the first series asking for further information about the Navy. All questions are answered in detail and are made as personal as possible and all "good prospects" are followed up with zeal, circulars, booklets, leaflets, etc., being sent them. In June, the officer in charge of the Marine Publicity Bureau states that 24 per cent of the first enlistments had received these letters. Circular letters are also sent to parents and guardians of boys who may enlist in the Navy. In these letters the advantages of naval life are fully set forth and an appeal made to patriotic feelings. No misleading statements are made, but the facts of naval life are dwelt on, with the benefits that a boy might receive during his enlistment. These letters are educational in character and are of great use in recruiting.

The source of these names are from men who enlist in the Navy, given by recruits, names sent in by recruiting stations, names sent in by men on the mailing list, names sent in by men aboard ship, from postmasters and voting lists and from other sources. A careful and elaborate method is maintained to carry out the circular letter system, "Dead" names beingc onstantly eliminated and "Live" ones added.

Many replies are received from parents asking for further informa-

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tion concerning the Navy. Many erroneous ideas concerning life in the Navy are corrected. Some of the replies are ludicrous in their ignorance and a few are abusive, accusing the recruiting service of trying to entice boys away from home. They are all answered and efforts made to correct the erroneous impressions.

General advertising.—This follows well-known lines and all methods of advertising are used as follows: Paid newspaper "want" advertising (this method is used very little at the present time); news articles and stories relating to Navy and Marine Corps life; billboard advertising; lectures before Y. M. C. A.; Chambers of Commerce, clubs and meetings of various kinds; moving picture films; stereopticon slides in moving picture theaters; posters in postoffices, business places, windows, etc.; ordnance exhibits at fairs, exhibitions and in show windows; automobile floats; sidewalk display stands; cards in street cars, windows and public places; half-tone pictures of Navy and Marine Corps life; calendars, circulars and hand bills; tin signs tacked up on streets and country roads; booklets, leaflets and folders.

In the preparation of advertising matter for the Navy, the appeal "MEN WANTED" has been done away with and a new slogan substituted; that is, the Navy "OFFERS" something.

The officer in charge of the Eastern Recruiting District of the Navy, in a recent circular letter to recruiting stations, states: "While this office concurs in the opinion as to the appeal made by the Navy recruiting advertisements, to enter the Navy to 'Learn a trade,' it is not believed that any men enlist through a patriotic desire on their own part to serve, or on the part of their parents to have them serve, the country; for, if patriotism were the motive, surely now, at a time when the public prints are filled daily with matter concerning 'preparedness' and the duties and obligations of citizens concerning national defense, we should be overrun with applicants for enlistment. It is believed that the first thought in the mind of the man who reads the recruiting advertisement is, 'What would I get out of it?' The poster which tells such a man what he may expect to get out of it, in the fewest words, will bring the Navy the greatest results; for this reason, the legend: 'The U. S. Navy needs good, healthy Americans, ages seventeen to twenty. Good pay. All expenses paid. A chance to see the world and learn a trade,' has been chosen. It is quite certain that the old method of sitting in an office and waiting for recruits to come in would certainly not get results.

"The acid test for our advertising media is the effect on, and the appeal to that particular part of the public which we are trying to reach."

So all of the new advertising matter now being sent out emphasizes

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the fact that the Navy has something to offer—SEE THE WORLD, SAVE MONEY, LEARN A TRADE and SERVE YOUR COUNTRY.

Great attention is paid by both the Navy and Marine Corps to the facts stated in their advertising matter. The posters gotten up by both branches are attractive and some of them have much artisitc merit. They all lay great emphasis on the idea that the service offers something and this is proven by tables of pay, pensions, learning a trade, seeing the world and serving the country. Much stress is also laid on the physical training, athletic sports, etc.

The Marine Corps Publicity Bureau maintains a very up-to-date press agent division and syndicate service, which supplies news to over 3,000 papers. A "story" of a man's promotion, transfer or any other matter of interest is sent to the newspaper of the man's home town. Recent stories of this character are the ones about marines hunting sharks; washing of white uniforms by sailors and marines, told to society women at Newport. Both bureaus also have on hand thousands of photographs of Navy and Marine Corps life, which are given to the newspapers for illustrations. These photographs are sent in from all parts of the world and are also used in the half-tone pictures for window cards, car cards, etc.

Several very elaborate moving-picture films have been made and sent out all over the country; chief among these is "Life and Training in the U. S. Navy," which shows all sides of life in the Navy. This film has been exhibited all over the country. Another is "The Hero of Submarine D2." Whenever these films are shown, men on recruiting duty hand out circulars and hand bills and answer all questions about the Navy and get the names and addresses of possible applicants. In practically every town slides are shown, at moving picture shows, concerning recruiting and navy life. Elaborate window displays are exhibited in cities and towns, of ordnance material, torpedoes, aeroplanes, and equipment. Lectures and talks are frequently given by officers and members of recruiting parties.

The Navy Bureau issues a weekly letter which consists of an elaborate and detailed report of all work done in the district for the week. It also contains suggestions, criticisms, experiences and recommendations of the recruiting parties. This exchange of ideas among the recruiting service has been very valuable in collecting data, clearing up difficulties and coördinating and systematizing the work.

The Marine Bureau issues a recruiting bulletin which keeps the recruiting service fully informed of its activities.

The work at the recruiting stations is roughly divided into "outside" work and "inside," or office work. The men on outside work

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distribute posters, signs, circulars and booklets, visit applicants, and interview parents and guardians. To give some idea of this work, the outside men of one station interviewed, in one week, over 700 applicants and parents of boys who were interested in the Navy.

In order to illustrate the difficulties which recruiting agents encounter, the following remarks are quoted from one of the weekly letters. From the many letters which are received at the Publicity Bureau, from parents of boys to whom recruiting literature has been sent; from the experiences of the men of this office, who have made a canvass of certain outlying districts; from the reports received from various recruiting officers in the Eastern Recruiting District, it is apparent that there is great need for a vigorous campaign of publicity and education as to the U. S. Navy. The recruiting officer at Johnstown, Pa., reports that "half the people around here have no idea that there is such a thing as a United States Navy in existence; it is as bad as trying to pull teeth, endeavoring to prove to some of these people that the Navy is no Federal prison or its equivalent." The recruiting officer at Dover, N. H., reports: "I have had trouble in putting advertisements in but one place, a blacksmith shop. When I asked the owner for permission to put in an ad. for the Navy and showed him the poster, he objected, saying that he was going to tear down what was up. When he was asked if he did not think it best to put up a sign for Uncle Sam, he said, 'Yes, I would do anything for Uncle Sam.' He did not realize that the Navy belonged to Uncle Sam." The recruiting officer at Danbury, Conn., reports, "One cannot realize the ignorance shown regarding the Navy throughout the country. In this location some of the people are awfully ignorant about the Naval Service."

Men interviewing applicants have had doors shut in their faces, others have been threatened with the law for attempting to entice boys away from their homes. This widespread ignorance of the Navy can only be overcome by education, and the new system of publicity is based on this. One of the best methods of bringing the new facts of Navy life to the class of men and boys we wish to recruit, is by personal contact of the recruiting agent with these prospective applicants. This feature is being more and more developed and takes up a great portion of the time of the men on outside work. For thirty-nine weeks in 1916, 9,068 such visits were made. When it is considered that, on each visit, much information and facts concerning Navy life are imparted by men who are well dressed and prosperous in appearance, the value of this educational work can hardly be overestimated.

Experience has shown that the best recruiting agents are satisfied men of the Navy. When these men return home on furlough they tell

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about their experiences and interest their friends. These men are encouraged to visit the recruiting office and their visits are recorded in the local papers. Forty per cent of the men recently enlisted at the New York station said they were influenced to enlist by having friends in the service.

The foregoing remarks give a brief outline of the present publicity work in the Navy and Marine Corps to obtain recruits. Governments have recognized the fact that "It Pays to Advertise," as has been shown recently in England in her efforts to raise an army. The only way to get recruits is to make the advantages of the Navy and Marine Corps life generally known. A large percentage of men reenlist. Why? If the reasons for this large number of reenlistments could be made generally known throughout the country, there would be no scarcity of men for the services. This country is so large that these facts do not reach a large number of possible recruits. These advantages must be made known, and this is being done at the present time by up-to-date advertising and publicity.

As this paper is being written, the recent Naval bill authorizes the Marine Corps to employ advertising agencies in advertising for recruits. It also authorizes the Navy Department to utilize the services of postmasters of the second, third and fourth class, in procuring the enlistment of recruits for the Navy and Marine Corps. Plans are in process of development to secure the best results from these new methods.

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RECRUITING FOR THE MILITARY SERVICE[1]

By Major FRANK T. WOODBURY
Medical Corps, United States Army

AMONG the many specialties practiced by the military physician, most of which are common to the profession at large, a few possess peculiarly military aspects not usually known to the civilian physician. We are all sufficiently well posted to know that military practice at the bedside, in the laboratory and the operating rooms of our permanent hospitals, is but civil practice in a controlled and very law-abiding community, chiefly men. Military surgery finds its counterpart in the accidents of industrial and metropolitan life. Military medicine in well-appointed posts or general hospitals is the same as in cities and towns. Military sanitation is the counterpart of sanitation of urban and rural communities, save that we know a stricter obedience to the letter and spirit of the law. The military surgeon is also obstetrician, pediatrist, ophthalmologist, alienist, as the occasion calls for his diagnosis and treatment.

There is one specialty which is practiced by the army and naval surgeon as well, whose homologue is known in part to the medical examiner for life insurance and to some extent, I believe, by railway surgeons. It might be called physical diagnosis of the normal.

Even in medical schools it is rare, during the course of instruction in physical diagnosis, for the student to see a sufficient number, if indeed he see any, normal physical specimens of men, women and children upon which to base his ideas of what constitutes normality.

A judgment of normality, as of disease, must be based upon a composite picture of many variations.

I feel that my own experience in the medical school gave me about the same diagnostic ability as that of the alleged physician who knew two diseases—one was smallpox and the other was not. I learned by anamnesis, symptoms, signs, and laboratory findings to recognize disease. I was left to discover of my own acumen, that when a person had none of these pathognomonic indications there was but one conclusion left—that not being sick he must be well. Being well he needed not a physician, but possibly an osteopath or a follower of Mrs. Eddy, or maybe a little discipline. Studies in malingering were not pursued except in medical jurisprudence, as but few cases, if any, presented themselves for demonstration to the class.

In the military service, however, the medical officer must be ever on the alert for malingering, which is the most difficult of conditions to

[1]Read at the April, 1916, meeting of the Medical Association of the Isthmian Canal Zone, Ancon Hospital, Canal Zone.

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substantiate by adequate testimony, at the same time being extremely careful that he does no injustice to the individual, and he is also called upon to exercise the great responsibility of selecting men for the military service.

I have, therefore, decided to discuss with you the subject of recruiting for the military service.

If we consider the military body as a physiologic entity, we immediately perceive that it has members whose structures vary directly as their functions and that these members are made up of units—the soldier, of which the officer is a specialized variant. Biologically speaking, the soldier is the unit of military structure and function. Upon his integrity and fitness depend the integrity and efficiency of the military body.

In the animal body the individual cell has no choice as to whether it develops into a connective tissue cell or a digestive cell, but in the military body the soldier may choose within certain limitations, depending upon his own fitness, whether he will become an infantryman or a quartermaster corpsman, for example. The military surgeon, when acting as recruiting officer, must bear in mind the functions of the branch of the service for which the recruit desires to enlist and the fitness of the applicant to perform those functions.

The function determines the standard within the limitations of the irreducible minimum. This might be considered almost a military axiom, to be used to group our ideas and, as I shall suggest later on, may allow of classification for auxiliary duties which are created out of the needs of actual hostilities.

Aside from certain legal, social, moral and intellectual requirements which we will not consider here, the Adjutant General's circular on recruiting says: "Applicants for first enlistment must be between 18 and 35 years of age, of temperate habits, able bodied and free from disease," and further specifies the minimum height to be 64 inches and the maximum weight to be 190 pounds for infantry, coast artillery and engineers. For cavalry the same minimum height and a maximum height of 70 inches and a maximum weight of 165 pounds. For field artillery the same minimum height and a maximum of 72 inches and a maximum weight of 190 pounds, with a special mimimum height, for mountain batteries, of 68 inches. The minimum weight for all branches is 128 pounds. Exceptions are made under special circumstances and for cogent reasons only, permitting a minimum weight of 120 pounds, upon the sole authority of the Adjutant General of the Army.

Generally speaking, the infantryman must have well-formed, well-arched, elastic and strong feet. He must be well muscled and supple,

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neither adipose nor lean. He must have excellent heart and lungs in a capacious chest, to supply him in his exertions; a good frame to carry his pack, a good eye to sight his rifle, a good ear to hear the enemy patrol, good teeth to chew and good digestion to assimilate his plain but nourishing ration. He must be intelligent and have the stamina of manhood in its prime, to bear with triumphant fortitude the hardships of service, neither inclining to the tenderness of youth, nor yet to the submission of age. He must not be so tall as to be a burden to himself, or so short as to be unable to bear his portion of the company duties.

The cavalryman need not have the frame and musculature of the infantryman, nor be so tall or so heavy, nor does he need such perfect feet and legs. His horse carries him and his pack. He needs suppleness of the waist and strength of arm. While he may fight in rencontre mêlée, he usually fights on foot in positions consecutively distant, whither he rides, and in formations usually near where his horse is held. He needs a keen eye and ear for scouting and patrols and he may be of younger age than the infantryman, as his service calls for dash and reckless daring in swift action, which is ever the delight of youth.

The field artilleryman combines the functions of the foot and mounted troops, according as to whether he serves with a mountain, horse, or light battery.

The coast artilleryman leads a more sedentary life than the preceding. His duties are laborious, but they are performed amid surroundings and under circumstances akin to many vocations in civil life. He is not ordinarily exposed to the hardships of short rations, nor required to endure the rigors of inclement weather continuously, without sufficient shelter or dry clothing, nor is he required to undergo forced marches as a preliminary to personal combat with the foe. He must have a well-built frame, of good height and well muscled. He need not be so agile and except under certain circumstances, where men are selected for special duties, he does not need keen vision nor hearing; indeed, if he have the latter, the concussion of big-gun firing will soon render him hard of hearing. He must not be a stripling, nor yet so old as to be incapable of training himself to his special duties.

The aviator requires excellent vision and hearing, a sound heart and lungs, resilient arteries, mental poise combined with supreme courage, to enable him to endure the great barometric and meteorologic changes in his flights and daring, to maneuver his plane and his guns amid the clouds, or drop bombs or act as an aerial scout, scanning the enemy's movements.

The other Staff Corps must conform to a general standard of physical excellence, with some variations for special duties. Thus we have

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the Hospital Corps, the Quartermaster Corps and the Ordnance Department, each with specialized work to do and much of it militant in form only, not differing in essence, but circumstances, from similar duties of civil life.

In considering the physical requirements for enlistment, I have thought it would be more interesting if, instead of quoting the bare standards laid down by orders and regulations, I should rather invite you to examine with me in imagination a candidate for enlistment, referring to variations and disqualifications as we proceed.

The applicant presents himself at the recruiting office of some town or city and is interrogated and examined physically by a line officer, who has had a period of instruction at a recruit depot. His examination weeds out a great number of ineligibles. As might be supposed, he cannot play the part of physician to perfection, and hence many disabilities get by him. Again in a desire to make a record he may disregard, or take a chance, in doubtful cases. I say nothing as to carelessness. Nothwithstanding care, this system costs the Government a certain amount yearly, for expenses of men accepted at recruiting stations and rejected at recruiting depots. For this reason I venture the personal opinion that recruiting should be entirely conducted by medical officers.

As we proceed in our imaginary examination I believe you will agree with me that the proposed creation of recruiting officers from postmasters, which will necessitate physical examinations by civilian physicians, will not be much more satisfactory, if not actually a shadow of the substance, when recruiting is stimulated by actual war.

The applicant, on arriving at the recruit depot, is given a bath and after breakfast, the following morning, he comes to the examining room in the depot hospital.

He is presented stripped to the skin, in a good light. Personal cleanliness, discolorations, diseases or other conditions of the skin are first noted; then the outline of the body, its proportions and posture; then deformities, swellings, obesity or leanness, fragility or sturdiness, immaturity and evidences of inward conditions as scars, lumps, depressions, asymmetry, and mental traits as intelligence or stupidity, silliness, loquacity, taciturnity, alcoholism and drug addiction, if any, are noted.

The above observations are made in a general survey, while the applicant is being weighed, measured as to height and chest circumference and is having his mouth examined for missing and defective teeth.

The applicant now stands directly in front of the examiner who, while passing the hand over the head in search of parasites and other diseases of the scalp, scars, depressions or lumps, asymmetry of the

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skull, malformation or loss of the ears, enlarged glands or goitre or mumps, asks, "Have you ever been struck or injured on the head, been knocked unconscious, had fits or fainting spells; do you use alcohol, tobacco or other drugs?" The face is then examined, while he is replying, for gross occular variations such as shrunken eyeball, strabismus, nystagmus, ptosis, exophthalmos, cataract, leucomata, epiphora, entropion, ectropion and granular lids; the nose for deformities, rhynophyma, acne rosacea, lupus and scars. The mouth is examined for hair lip and cleft palate, deforming scars, caries of the jaws or ankylosis of the temporo-maxillary joint, and the ears for loss of pinna, atresia or evidences of operations or disease.

The head and face should be symmetrical. Any unsightly scars, discolored marks, tumors or marked ugliness, though not the evidence of active or latent disease, are cause for rejection, as such bring unpleasant notoriety to the man and are therefore subversive of discipline.

The throat is scanned for goitre, branchial cysts or fistulae, enlarged glands, aneurysms and scars.

The chest is then inspected for asymmetry, deformities such as pigeon and funnel breast, mammary development and all evidences of operations, wounds, accidents or disease of skin, chest wall, or lungs.

The thoracic organs are examined by the usual diagnostic methods, meanwhile asking the man if he has ever had a persistent cough, spat up blood, had lung fever, or rheumatism, or sore throat, and whether any of his family died or are sick with consumption. The X-ray may be called in, and the microscope, to decide questions of doubt.

The abdomen is examined for prominence or depression, herniae, scars of wounds or operations, adiposity and varicosity.

The genitals are then examined for hernia, hydrocele, epididymitis or orchitis, absence of or undescended testicle; loss, absence of, or deformity of the penis, as epi- and hypospadias and scars or other evidences of venereal disease; meanwhile the candidate is asked if he ever had clap or a sore on the penis, been ruptured, had trouble in passing water or if he wets the bed at night. His statements are confirmed or disproved by signs observed. In suspicious cases a urethral smear is examined microscopically and inquiry made as to recent exposure to venereal disease.

Next the legs are inspected for deformities, such as genuvalgum and genuvarum, sabre shanks, exostoses or ecchondroses, joint swellings, scars, ulcers, eruptions or other evidences of disease. The feet then require especial attention to discover club foot, flat foot, hallux valgus, hammer toes, polydactylism or missing toes, web foot, ingrown toenails, bunions, corns, Morton's toe and bromidrosis, also evidences of injuries.

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The applicant is then faced about with his back toward the examiner, who, running his hands over the scalp, down over the neck, over the shoulders and down the arms, examines for enlarged post cervical and epitrochlear glands, supernumerary or cervical rib and deformity of the shoulder girdle and arms, and confirms previous examination of head and ears.

The applicant, standing squarely, with heels as nearly together as his conformation will permit, is then inspected for scoliosis, kyphosis, prominent hip joints, short leg, varicose veins, scars or skin diseases.

He then is required to lift up one foot and then the other to exhibit the soles to show callosities, flat foot, scars or other conditions, and then is required to lean over with the feet spread and asked to pull the buttocks apart with both hands, to permit inspection for spina bifida, hemorrhoids, fistula, condylomata, evidence of sodomy and scars of operations or accidents or disease.

The applicant is again made to face the examiner, and required to stand on the toes, extend both arms, flex all the joints, and the hands are examined for strength of grip and pull of the right index finger, for missing or supernumerary fingers, sprains, stiffness, wasting or deforming scar and evidences of injury. At this time he is asked if he has ever had a broken bone, a joint out of place or stiff, or an operation of any kind. This is precautionary, and may lead to special examination of scars or joints.

The applicant is then put through a set series of exercises tending to disclose weakness, stiffness, awkwardness and heart murmurs, as well as respiratory power, by various calisthenics and movements, ending with hopping entirely around the room on the toes of one foot and then the other, following which he is laid on a table and the heart and lung sounds are ausculted and previous findings compared or confirmed. The belly is again examined by palpation and absence of hernia confirmed. Knee jerks and other evidences of nervous conditions are inquired into.

The applicant is then taken into the eye room where the examination of the vision with the Snellen cards and hearing by a voice test at 20 feet are made. He then goes into a dark room and the eyes are examined by reflected light and the ophthalmoscope and retinoscope, if conditions call for it. The nose cavities are examined for polyps, deflected septum, synechiae, rhinitis, ozoena and perforation of the septum. The mouth is examined to see the posterior nares, the pharynx and the openings of the eustachian tubes; the larynx to disclose cause for voice changes or cough, if any; the tonsils, the teeth, the buccal mucous membrane and the tongue and floor of the mouth.

All doubtful or unusual features are given special attention and refractive errors are corrected, if not due to disease.

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The applicant is now tested as to color sense, reading and writing.

During the course of the examination of a number of applicants, each one has had an identifying photograph taken, his finger prints impressed and identifying body marks indicated on an outline figure on his identification card. This is extremely important as it affords the most reliable means of identifying him should he at any time during his subsequent service be found delirious, unconscious, or dead, and identification by the features or clothing be impossible. It is also a perfect identification of deserters, or of men fraudulently reenlisting under assumed names. His enlistment papers have also been completed by the clerical force, and are ready for comparison and signature by the enlisting officer, as soon as the recruit has taken the oath and signed it. The recruit is now ready to have explained to him the nature of fraudulent enlistment and the penalty therefor, the term and nature of his enlistment, and any last questions can be answered before finally taking the oath of enlistment. If any abnormalities are discovered, the applicant is examined, when practicable, by another medical officer to decide in doubtful cases, and if found disqualified he is rejected and not permitted to enlist. An accurate record of all the points noted during the physical examination is kept on a card which is filed in the office of the medical officer who enlists, to meet possible subsequent questions in the case.

After enlistment the applicant is given his first inoculation of the typhoid prophylactic in the right arm and vaccinated on the left.

If the examining force has been properly organized according to the accepted plan, it should be able to begin at 7.45 a. m., with eighty recruits and send them to their dinner at 12.30, ready to draw clothing and be assigned to their organizations before 3 p. m. The enlistment papers will have been compared, especially the identification records, to see that they are correct in every particular, signed and posted to the Adjutant General in time for the afternoon mail.

The scheme of examination outlined is the foundation upon which we build our judgment as to the man's condition, and does not vary much from the usual diagnostic procedures, except that the applicant is often striving to conceal diabilities, while patients often complain of more disabilities than their physical signs and symptoms can account for.

Sometimes when an applicant changes his mind about enlisting, or has come up for the railroad fare and wants to get a ticket back to the place he made application in, he will feign disabilities or give histories of imaginary illness or accidents. Such always betray themselves, though often requiring some patience and skill on the part of the examiner, in the process.

(*To be continued*)

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THE HEART OF THE RECRUIT AND THE SOLDIER

By E. KILBOURNE TULLIDGE, M.D.
Former Captain-Surgeon, Austrian Army

THE difficulties experienced in the examination of the large number of recruits, for the different military services of the present warring nations of Europe, have simmered themselves down until today there are practically only two organs that cause the examiner any embarrassment—the heart and the lungs. In order to give each and every recruit full justice, they should be carefully examined in a quiet room under the most favorable circumstances possible. Environmental surroundings and the attitude of the examiner are important points of significance. The recruit is naturally nervous and somewhat timid and should not be allowed or permitted to remain iutside of the examining room standing, partly or wholly undressed. The quarters should be warm, pleasant and cheery and the examiner the same, making it a point to question the applicant upon one or two minor facts before requesting him to disrobe or to step into an adjoining room for that purpose.

The separation or division of the men undergoing inspection of this character into classes or groups, according to their capacities, is an essential necessity, thus separating the wheat from the chaff and bagging it according to its perfection and quality. In so doing no man will be sent to a work for which he is unfit, nor will any man be put through a drilling that his constitution or present state of strength does not warrant. A recent German classification has established four grades or divisions in which recruits can be placed by the physician-examiner: (1) Those fit, without question, for service. (2) Those fit only for certain exercises and for the use of certain weapons. (3) Those not fit for active service at the front at the time of examination, but who under proper supervision and development could be made so in a reasonable time. (4) Those absolutely unfit for service of any kind. It is comparatively easy for even the inexperienced examiner to decide upon those who are generally fit, as well as those who are absolutely unfit; but it is not so simple for him to determine those who must be placed in Class 2, and to select for them special kinds of weapons. In this class will be found those with flat-feet, varicosities, slight cardiac disturbances and abnormalities of vision which debar them from the march, marksmanship, etc. The third class, in which are placed those suffering from conditions amenable to treatment, such as hernias, large varicoceles, hydroceles, venereal cases, slight cardiac, gastric,

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intestinal disorders and under-development. The recommendations to this division are made not without great difficulty and not until after much consideration and careful investigation. Particularly is this true of the heart cases. Here the slightest mistake might prove disastrous, and a careless investigation result in a gross injustice to both the state and the man.

Factors for consideration and record, by the examining physician, should cover at least the following points of the patient's general make-up: Firm elastic skin, body weight proportional to the height, neck of corresponding thickness, regularly developed chest, good straight back, strong bones, general muscular development, gait, condition of the soles of the feet and the elasticity and tone of the muscles. These superficial points will give great help and assistance to the further and more complete investigation of the different organs and senses.

We all know that many of the candidates, whose hearts are perfectly healthy, suffer from palpitation or increased irregular action under the influence of apprehension and excitement incident to the examination. During this stage the beat may become forcible and rapid; even an irregular systolic murmur may be present. If such a candidate be told to lie down and breathe slowly and deeply for a few minutes, the heart's action will become less violent and the rate diminished. Not alone, as a result of excitement, do we find apparently abnormal murmurs in the healthy heart of the young, but under normal physiologic conditions there are often found variations in the rate and rhythm, with accompanying murmurs that are indicative neither of disease nor impairment. For this reason, if for no other, the examiner should ascertain the amount of exertion the applicant has been accustomed to take, during his work or play, and if he can undergo bodily exertion without distress. If the candidate's response to effort be normal and the heart normal in size, the murmur should be regarded as negligible; since, if the cause which produced the murmur hampers or embarrasses the organ in its work, the size of the embarrassed chamber would increase and its functional efficiency be impaired. With a history of good functional efficiency and a normal size of the heart found, the recruit may be considered suitable for enlistment, provided he has not at some time been a competitive athlete, in whom a semi-conscious state of cardiac exhaustion had manifested itself at conclusion of a contest, with ultimate loss of recuperative power. Many physicians coupled, with the above disturbances, palpitation, pain, especially on emotion, slight shortness of breath associated with physical signs displaying diffuse apex beat, systolic murmur at the apex but heard loudest over the pulmonic area and disappearing entirely when the patient

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is in the erect position, and accompanied at times with vasomotor disturbances. This condition, according to Da Costa, is brought about by over-exertion, combined with too much tobacco and, often, sexual excesses, and should be classed as a simple neurasthenic or irritable heart. Notwithstanding the non-pathological significance of such a heart, many perfectly good recruits have been and are today turned down by the Army and Navy recruiting officers because of the presence of these signs. The systolic murmur with the first sound of the heart should not be mistaken for a valvular defect; it is merely a relative or functional disturbance in the growing organ. Treupel has found this condition in seventy-six of a hundred recruits, otherwise presenting normal cardia. Early in the war cardiac murmurs were more commonly accompanied by bradycardia, tachycardia or arhythmia often with gastrointestinal disturbances of a neurotic character. As the war progressed the neuroses were thrown off or forgotten and the heart, previously considered in doubt, bore the stress of the campaign remarkably well. It is important, as C. Aubertin reported at the last session of the *Societe Medicale des Hopitaux de Paris*, that of a number of patients he had observed, five between the ages of 20 and 30 years, who had passed through one of the severest campaigns of the war without injury or inconvenience, carrying with them an aortic insufficiency, not one of them had shown even signs of edema, arhythmia, angina crises, pulmonary disturbances, liver or asystolic developments. Others there were whom I personally found suffering from chronic heart affections, who had volunteered to go to the front and who kept themselves in good condition with very small doses of digitalis, taken for continuing intervals over certain periods of time. Three officers with mitral regurgitation had withstood the stress of real action, under fire, without ill effects, and were of great value and assistance to the staff. Treupel comments on the remarkable way in which soldiers with old well-compensated valvular defects are pulling through the war.

It may be of interest to note here a few of the results recorded at one of the large Austrian conscript examining stations established early in the conflict. The largest number of eligibles were found among the laborers, the ratio being about 6 to 1 in proportion to the comparatively few selected from amongst the scientists and students. Those conditionally rejected, or placed in classes 2 or 3 of the above divisions, were principally over 26 years of age; and the approximately 6 to 10 per cent, absolutely refused or rejected, were as a rule between their twenty-fifth and twenty-ninth years.

A routine practice should be established in which the heart of each and every wounded man brought from the field should be examined.

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This can be done at least in the base hospitals, if not at a field hospital, and any signs of a disorder noted, and recorded with the patient's personal statistics that accompany him. The results thus obtained would be surprising, bearing as they do directly upon the effect of the nervous system upon the heart. Comparatively few of the cases that I examined presented an adequate previous or past history to which could be accredited their present condition. Some there were, however, who had suffered from acute rheumatism both before and during their service in the army; others, suffering from arteriosclerosis or syphilitic vascular trouble, had slight symptoms before the war, but the majority showed no signs of previous involvement. In most of these cases the heart symptoms developed suddenly, following some physical strain or stress of the campaign. In a number, chiefly younger men, the disturbance could be traced directly to the excessive use of tobacco, resulting in increased blood pressure and concomitant signs of a developing insufficiency. This to my mind is a strong indication, and an important one, that tobacco, notably cigarettes, should be restricted among the troops in active service. True, its use fulfils a much-needed and sought-after solace—but there is no question that it is carried to excess, with results that must necessarily weaken and lower the physical and systemic resistance of the men. I fear that this is a matter which has been overlooked and that when more attention is directed along this line a wide gap in the road to top-notch efficiency will be discovered. Merkel told me in München that he felt sure the enormous consumption of beer by the soldiers produced, without doubt, detrimental effects upon the heart muscle. If this is true—and we all concede its possibility, even probability—how much more destructive would the poisonous effects of nicotine be upon the already nervously excited, overworked and taxed, emotional cardia? In the field we found cigarette fiends, a class so frequently spoken of as "chain smokers," who were consuming seventy cigarettes per day each. Many of the men smoked more, and I fail to remember one who did not smoke constantly to excess. As a result not only were nervous phenomena of the heart observed, but catarrhal conditions of the mouth, throat and pharynx occurred, with gastrointestinal symptoms of every description. There was no question in the mind of Dr. Jung, of Washington, D. C., who was caring for soldiers suffering from "*magenkrankheit*" (stomach trouble) in a hospital in München, that tobacco was directly responsible for 96 per cent of his cases.

It is an extremely interesting fact that nervous cardio-vascular disturbances are observed particularly, when the men are making official reports on the events of the war's trials and hardships, thus

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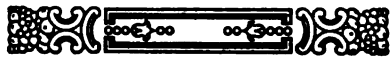
demonstrating anew not only the psychic origin of the neuroses but the necessity of treatment based upon this fact. Herein lies a prognostic factor of value—the outcome depends on the ability of the physician to influence the patient's mind—an entirely different method from the treatment applicable to those suffering from heart failure. In the former cases the chief complaint is an absence of feeling well, a sense of fatigue, exhaustion, dyspnea, palpitation, pain and varied mental conditions, with periods of depression, irritability, evidences of general nervous instability and constitutional inferiority. They accept the view that they have something wrong with their heart and readily yield to its influences, being willing and content to lie in bed for indefinite periods of time brooding over their suspected affliction.

The treatment of such cases should be devoted not only to the mental side of the condition, but to the increase in the health of the body as a whole, in such a manner as will increase assimilation, natural resistance to infections and elimination of detrimental toxic influences, thus bracing and building up the man both physically and mentally. Open air and graduated exercises are what is needed, regular hours for sleep and rest, nourishing, wholesome, easily digested food and a daily well-directed to-the-point talk, all of which are conducive to a gradual upbuilding or recuperative termination that will enable the soldier, to resume his duty and service at the front. Digitalis is in reality useless in the nervous forms of these disorders and small doses, if any, are better when its use is indicated. Sleep, combined with psychotherapy, is the chief factor in the cure, extending over a maximum period of from two to three weeks.



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THE SPECIAL PHYSICAL EXAMINATION OF AVIATORS FOR THE UNITED STATES ARMY

By Major CLARENCE H. CONNOR

Medical Corps, United States Army

THE question of the physical examination of aviators is one of considerable importance since the use of air craft has begun to take such a prominent place in the military service. In such a hazardous vocation it is of the greatest moment to ascertain what physical deficiencies exist that might lead to avoidable accidents, and, by proper examination, eliminate those candidates found to be unfitted for such a risk.

Recent researches into the condition of the vestibular apparatus of the internal ear have opened up a line of investigation that enables us to determine, to an extremely accurate degree, the question of whether a candidate's sense of equilibrium is normal or otherwise; for one who has a defective perception of equilibrium would certainly be unsafe in aviation.

This physical examination should be thorough. The candidate should be normal as to his general condition. A heart lesion or an unstable nervous system, in fact any defect that would interfere with his usefulness, should be cause for rejection. But the most important part of the inquiry narrows down to the examination of the sense of equilibrium which is controlled by, or, rather, subject to impulses emanating from the centers in the brain (centrifugal), or those coming from the eye (centripetal), the ear (vestibular apparatus), or general body surface (muscle sense.)

The question of the eye is easily settled; without perfect vision a candidate is not to be considered. He should be carefully questioned as to any history of eye disease, diplopia, scotomata, or headache after use of the eyes. The movements of the eye must be regular and identical; there must be an entire absence of ocular nystagmus when the eyes are at rest, looking straight ahead or as much as 40 degrees laterally, although ocular nystagmus when the eyes are rotated to their fullest extent is not a cause for rejection as it is not necessarily pathological. The usual tests with a phorometer will quickly detect any muscular deficiency, and then by instilling a cycloplegic we may determine any latent error of refraction and examine the fundus for disease.

The test really rests with the ear, or rather the labyrinths of the internal ear, and the studies of various investigators (Barany, in particular) enable us, by a series of tests, caloric, rotation, fistula, and

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galvanic, to determine the functionating powers of either or both organs.

In the labyrinths, as is well known, we have the vestibule and the three semicircular canals in which is the lymph, whose movements act on the end organs situated in the ampullae of the canals, and produce, according to the amount of movement, various results such as reflex eye movements (nystagmus), vertigo, and sometimes nausea and vomiting. Results are expressed by the eye movement (vestibular nystagmus), which must be distinguished from ocular nystagmus; in the latter the movements are regular and of the same rapidity in each direction (undulating), whereas in vestibular nystagmus there is a quick movement toward one side and a slow one toward the opposite. This nystagmus reflex is enhanced when the eyes are turned toward the side of the quick movement and is diminished when the eyes are fixed or turned toward the side of the slow movement, the original movement recommencing on again turning the eyes toward the side of the quick movement. It is the quick component that is used in reference to this examination form; that is, when we speak of the movement, be it toward or away from either ear, it is the quick movement to which we refer.

The auditory examination takes in also a routine examination of the ears for deafness (less than 20–20 is cause of rejection), otitis media, either catarrhal or suppurative, perforation of the tympanum, otitis externa, and, in fact, any diseased condition whatever, which would mean rejection. And it might be stated here that the nose and throat also come in for a careful examination.

Vestibular nystagmus can be produced, as has been said, in four different ways: caloric, rotation, fistula, and galvanic. Since the two last are not used they can be dismissed in a few words; the fistula test, if present, indicates a diseased condition, since it means that the tympanum must be absent or perforated and the bony wall of the labyrinth weakened or must have a fistula in it. The test is made by placing the tip of the Politzer bag in the external auditory orifice and making pressure on the bag; if there is a fistula present the pressure in the canals is increased, which sets up a current in the lymph and produces nystagmus. This is of no importance, as the diseased condition of the ear would have been discovered elsewhere in the examination. Galvanic nystagmus goes into the realm of electricity, is not necessary here and need not be considered further.

Caloric tests are made with water, warm and cold. When warm water is injected into the ear the lymph in the canals has its temperature raised, its specific gravity changes; this produces a current in the lymph which, acting on the end organs in the ampulla of that canal, produces

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reflex eye movements, or nystagmus, the movement being toward the irrigated ear, but if cold water is used, vice versa.

We are able to test quite accurately the three different canals of each ear, by placing the head in various positions so as to make the one under investigation assume a position as nearly vertical as possible. With warm water the lymph rises and sets up a current in one direction, while with cold water the flow is reversed. The currents thus caused will start a nystagmus reflex through the end organs in the ampulla of the canal. To make the test, the head is first placed in what is termed the *optimum* position, that is, 60 degrees backward from the vertical, and then we irrigate the ear with warm water at a temperature of 27° C.; if we have a normal condition we should get nystagmus toward the irrigated ear. Next bringing the head into the *pessimum* position, 90 degrees forward, the movement should stop, to again recur when the head is replaced in the optimum position. If the nystagmus appears we need no further tests as we wish only to determine the presence of a functionating organ.

Sometimes, however, the warm water fails and then cold water must be tried, at a temperature of 20° C., testing each ear in all three positions of the head. If we are then unable to produce the desired result, the rotation test must be used, which is done by whirling the candidate in a revolving chair a certain number of times to the right and left. This rotary movement of the body will gradually start a movement in the lymph in the horizontal canals and after ten turns we get the maximum effect.

To perform the test, a trial frame containing a pair of opaque discs is placed in front of the candidate's eyes, far enough forward to enable one to see the eyes and yet prevent the candidate from fixing on anything; he is then rotated ten times to the right and on stopping we should have nystagmus to the left which should continue forty seconds. It is enhanced by turning the eyes 50 degrees or more to the left. The whirling is then made to the left and the nystagmus should appear to the right, or opposite side.

This is a positive test but has a disadvantage in not testing each vestibular apparatus separately, as is the case with the caloric test; and if a positive result is obtained in the rotation it is well to go over the calorific test again, as it may not have been carefully done the first time.

The examination of the muscle sense with reference to the equilibrium is based on the Romberg phenomenon in tabes and is divided into a static and a dynamic test; that is, standing still and moving. The candidate stands with bare feet, eyes open, arms hanging at the sides,

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knees pressed backward and inner margins of the feet touching; this position must be maintained indefinitely without swaying. He must also be able to rise upon the toes and maintain the position for one minute. Next on the flat foot again with one foot off the floor; if preferred, the elevated foot may be rested against the other ankle or knee. This position should be maintained for a quarter or half a minute. The test is repeated with the other foot, and again repeated with the eyes of the candidate closed. Slight swaying or occasional efforts at balancing are of no significance.

In the dynamic test, the candidate takes the same position as in the static test and moves along a straight line for about 20 feet on the full flat feet, first forward, then backward. Next hopping on first one foot and then the other, then on the toes of one foot and then the other, all the tests being finally repeated with the eyes closed.

A wide variation between the tests with the eyes open and closed is cause for rejection; so also is marked swaying in the static test or a decided inability to keep on a straight line in the dynamic.

If the candidate has been able to satisfy all these tests, there is no doubt that he has normal functionating vestibular apparatuses and can maintain a normal equilibrium whether on the ground or in the air.

Perhaps a few words would be well as to why there is a necessity for these tests. Stimuli to the sense of equilibrium originate only in changes of motion; for this reason uniform currents, whether in a straight line or in a curved direction, are perceived only at the beginning and cessation of, or by sudden changes in velocity. For instance, it is impossible to indicate the direction in which a railroad train moves at a uniform rate, with the eyes closed; hence the necessity for perfect vision. And this fact is of the utmost significance to the flyer. Should he, in consequence of vestibular trouble, lack the accurate perception for change in direction and velocity, in addition to this normal want in the sense of equilibrium, he would be utterly helpless in a fog, for instance. A sudden rise to a great height would prove disastrous to him, should there be a failure of perception to recognize the stimulus to the labyrinth.

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COMPARATIVE HEARING REQUIREMENTS IN FOREIGN AND AMERICAN NAVIES

By Passed Assistant Surgeon G. P. TRIBLE
United States Navy

THE conditions governing the hearing requirements in foreign navies are necessarily different than our own. In only one, the British, does the system of voluntary enlistment prevail. In the others the recruits are drafted for the most part and, usually, the conscripts from the sea-faring districts go to the navy, when required, while the others go to the army. Volunteers make up but a small proportion of the services in time of peace. The requirements given below are those demanded in time of peace and were in effect two or three years ago.

FRENCH NAVY

The voice and watch tests are in use; the requirements for the watch are not definitely stated, merely that the watch should be heard at 1 meter to 1¼ meters. The hearing by spoken voice, is ascertained by addressing the man under examination a few questions in a low voice. An examination is made of the external ear, external auditory meatus and canal. Officers are given the same examination; no order prescribes that a special hearing test be made upon promotion of either men or officers. The following instructions are given to determine the state of the auditory functions: (1) Find the extent of the field of audition for speech, by measuring the distance at which a word pronounced in a low tone ceases to be heard. (2) Determine the degree of acuity of hearing for slight and regular noises, by measuring the distance at which the noise of the movements of a cylinder watch commences to be heard.

BRITISH NAVY

The candidate to stand with his profile to the examiner and at as great a distance from him as the space available will permit. Each ear to be tested separately, the ear nearest the examiner to be covered. The examiner to speak a few words in a low tone of voice, or in a whisper, according to the distance, the candidate to repeat the words. A careful inspection of each ear and its canals is made. No reexamination is made under ordinary circumstances.

JAPANESE NAVY

The person undergoing the examination stands about 6 feet from the examiner, the ear to be examined to be turned toward the latter, the

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other ear to be tightly closed; tests are made by whisper voice and the phrases given are repeated by the candidate. Examination is made of the external auditory canal and membrana tympani and the potency of the Eustachian tube is tested.

RUSSIAN NAVY

Those are considered disqualified who suffer from deformity of the external auditory canal, chronic suppurative middle ear disease, and in some cases, aural polypi without suppuration. In certain cases deemed curable, hospital treatment is given. Deafness or dullness of hearing in both ears, if the person does not hear distinctly a low voice from behind at a distance of 4 arshins (2.84 m.) or a loud voice at a distance of 12 arshins (8.54 m.). Some exceptions are made in the case of the administrative branches. To enter school for studying special branches, such as the submarine school, gunnery school or diving school, the requirements are higher, and those suffering from catarrh of the nose and throat or retracted drums are excluded. The requirements for officers graduating from the naval school at St. Petersburg and the engineering school at Cronstadt are more rigid. No repeated periodical examinations of hearing of officers is made during their term of service, except in case they enter the diving school or the submarine school; in these cases the hearing must be normal. According to special instructions those suffering from the following defects are not admitted to the service on submarine boats: chronic catarrh of the external auditory canals, scars and dry perforations of the ear drums, affections of the middle ear cavities, dry as well as purulent, catarrh of the Eustachian tubes, insufficient mobility of the drum or retracted drums. In this service a whisper must be heard at a distance of 9 meters.

GERMAN NAVY

Prior to the examination of the hearing the ears are examined with a speculum and a written report taken down as to the condition of the drum. All foreign bodies, wax, etc., to be removed by irrigation with warm water so that a clear view may be obtained. In case of haste in mustering in of recruits, and satisfactory examination cannot be made, note for instance "hard plug ear wax right side." Hearing is tested by whispered voice in a closed room, first determining the hearing distance of normal cases for that room and using this distance as a standard. The ear not under examination is to be tightly closed and turned in the opposite direction, eyes to be covered; after making a deep exhalation use the residual air whispering numbers from one to one hundred. Numbers with clear vowels, a, e, i, of strong sound and hissing sounds like seventy-seven forty-seven (German equivalents), to ascertain

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defects in the sound conducting organs, numbers with deep sounding vowels, o, u, to determine nerve function. Normal distance whispered voice, closed room, 20 to 25 meters; since this distance cannot be obtained usually, it is necessary to qualify as, for instance, examination room 8 meters long, hearing right, 6 meters good, left 6 meters; or whispered voice examination room 6 meters right ear 6 meters good, left 6 meters scarcely (or just 6 meters).

AUSTRIA-HUNGARIAN NAVY

Medical examination of applicants as pupils to the naval academy, as ship or engine room boys, is the following: A range of hearing of whispered voice in a closed room where there is as little noise as possible of 12 meters is described as "good" (*i. e.*, normal hearing). In case of general able-bodiness, a defect of one ear does not exclude from admission those with hearing of not less than 6 meters on the defective side, if the range of the other ear is normal. Range of less than 6 meters of even only one ear, is a cause for rejection. In the medical examination of sailors there is certain latitude given, since those who are partially defective are accepted for auxiliary service. Those with a hearing for whispered voice above 4 meters are accepted for full military service. If one ear has a hearing of at least 6 meters and the other ear 1 meter or above, the man is passed; with a hearing of less than 1 meter on one side, if the hearing on the other side is at least 6 meters, the applicant is accepted for auxiliary service.

UNITED STATES NAVY

In the case of the enlisted personnel, instructions are given for a thorough examination of the organs of hearing. Deafness (complete) in either ear is a cause for rejection. The presence of polypi, otorrhea, perforation, etc., is noted and may be a cause for disqualification. The hearing requirements in general correspond to those given below, though in some cases of defect a waiver may be requested.

Candidates for Appointment as Commissioned Officers of the Navy or Marine Corps from civil life are required (Article 1964, Manual for the Medical Department) to possess normal hearing, 40/40, by watch, and 15/15 by voice. "In the case of promotion, the nature of the duties of the candidate should be considered, but as a rule less than 7/15 hearing in either ear is a disqualifying defect."

Admission to the Naval Academy.—In Articles 1995 and 1996, it is prescribed that the organs of hearing, both the conducting apparatus (outer and middle ear) and the receiving apparatus (internal ear), must be free from disease.

The ticking of a watch is to be heard at 40 inches in quiet surround-

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ings, and the candidate should be able to recognize at a distance of 5 meters, in a quiet room, words spoken in a stage whisper with the reserve air, after an ordinary tidal expiration. Under similar circumstances, faint clear whispers should be heard at a distance of 1 meter. The usual conversational tone should be heard by normal ears at a distance of 10 meters.

Aviation Duty.—Article 2113, Manual for the Medical Department. Any diminution of the acuity of hearing below normal will be cause for rejection. Any disease of the middle ear, either acute or chronic, or any sclerosed condition of the ear drum resulting from a former acute condition, will be a cause for rejection. Any disease of the internal ear or of the auditory nerve will be a cause for rejection. Additional tests for equilibrium are made to detect otherwise obscure disease conditions of the internal ear (labyrinth control).

It can be seen by comparing the above requirements that our requirements are more rigid and, provided they are strictly enforced, the hearing in the case of either the officers or the enlisted personnel in our service must be considerably more acute than that considered necessary in other naval services. It is highly probable that their requirements have been lowered to an appreciable degree during the present conflict.

A moderate degree of deafness, if due to catarrhal middle ear disease, internal ear derangement or otosclerosis in the case of those already in the service, is not such a disability as it would first appear. The constant noise and turmoil incident to ship life render even a marked tinnitus unnoticeable, while when ashore it may be quite troublesome.

In the European services filled by conscription, the suppurative ear conditions are not considered a bar to the effective discharge of military duty. But with us it is open to question whether the services of these cases are desirable, unless in time of actual conflict. This refers, of course, to any appreciable percentage, not particularly to isolated cases. The constant presence of ear discharge, often accompanied by a fetid odor, renders the individual a source of annoyance, if not an actual menace to the sanitary welfare of the ship. Surgical complications may intervene at any time. The thought arises, why not cure this afflicted individual? The multiplicity of treatments recommended renders it obvious that the efficacy of each may be questioned.

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DEMOGRAPHY IN SO FAR AS IT RELATES TO THE VITAL STATISTICS OF ARMIES

By Lieutenant Colonel WESTON P. CHAMBERLAIN
Medical Corps, U. S. Army

(*Continued from December*)

Diseases of the Digestive System

IN THE ten-year period 1890–1899, diseases of the digestive system were a little more common among whites, the proportion being 355.98 to 343.29. For the last decade in the United States digestive disturbances were considerably more prevalent among white troops than among the colored, while in the Philippines the reverse condition was found. For Filipinos the rates were materially below those for white.

As regards one of the most serious of the tropical digestive diseases, viz, dysentery, Johnson states that a race out of its own habitat is a greater prey to dysentery, owing to the adoption of a mode of life and

Table VIII.—*Admissions and Death Rates per* 1,000 *for Dysentery in Philippine Islands among White, Colored and Filipino Troops,* 1905–1914

Year	Admissions			Deaths			Year	Admissions			Deaths		
	W	C	F	W	C	F		W	C	F	W	C	F
1905	63	x	23	0.6	x	0.0	1910	19	x	10	0.3	x	0.0
1906	42	86	20	0.3	0.0	0.6	1911	14	x	8	0.1	x	0.0
1907	42	44	24	0.2	0.5	0.6	1912	18	7	7	0.1	0.0	0.0
1908	27	22	11	0.4	0.0	0.0	1913	24	5	7	0.6	0.0	0.0
1909	45	28	10	1.1	0.9	0.2	1914	13	14	9	0.1	0.0	0.0
Mean.	....	....	....	....	....	.....	.....	31.0	24.1	12.6	0.4	0.2	0.1

diet unsuited to the necessities of the climate. He claims that the mortality is usually greater among the native populations. In our own service, during the past decade, Table VIII shows that the relative numbers of admissions for dysentery in the Philippines varied greatly from year to year, but averaged over 20 per cent lower for negro than for white troops. They were less than half as great for Filipinos. Death rates averaged per thousand for whites 0.4, for negroes 0.2, and for Filipinos 0.1, but the total numbers of deaths are too few to give the figures a great deal of value.

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Rheumatism

For acute articular rheumatism Munson states that the admissions are lower for whites. The statistics for the last decade fully coincide with this view. In the United States the admissions averaged 10 per cent higher for colored troops, while in the Philippines there were twice as many admissions for negroes. For Filipino soldiers the rate was a little less than for whites in the Philippines.

Chronic and subacute articular rheumatism during the decade caused about 75 per cent more admissions for negroes than for whites at home and two-and-one-half times as many in the Philippines. In the past "chronic rheumatism and myalgia" has always caused a great excess of admissions for negroes, the rates for the period 1884–1893 being for white soldiers 78.68 and for negroes 121.60, and for the decade 1890–1899, 56.89 and 99.23 respectively.

TABLE IX.—*Admissions per* 1,000 *respectively for Acute Articular Rheumatism and for Chronic Rheumatism (including Sub-acute) for American Army in United States and Philippine Islands,* 1905–1914

Calendar year	United States				Philippine Islands					
	Acute		Chronic		Acute			Chronic		
	W	C	W	C	W	C	F	W	C	F
1905	11.6	11.7	6.0	15.6	5.0	x	4.9	6.2	x	1.5
1906	10.8	10.5	7.1	9.7	5.7	12.7	4.4	5.4	3.1	1.1
1907	9.1	17.3	6.2	8.7	3.4	8.7	3.4	2.9	17.3	0.6
1908	9.0	16.6	6.7	1.4	4.7	13.3	3.1	3.1	18.1	2.1
1909	8.7	5.6	6.1	2.6	3.3	11.2	3.0	3.5	4.3	0.6
1910	7.7	10.7	4.5	7.7	4.3	x	2.6	3.8	x	1.6
1911	6.4	6.1	3.9	7.1	4.8	x	4.0	2.5	x	0.6
1912	8.4	6.4	1.4	4.0	4.0	11.8	4.4	1.6	1.5	0.4
1913	6.2	4.1	1.8	1.8	3.4	2.1	3.5	1.3	4.4	0.2
1914	5.6	8.8	0.9	2.2	1.7	1.1	3.0	1.7	0.0	0.4
Mean....	8.1	9.1	4.1	7.1	4.1	8.1	3.6	3.3	8.2	0.8

Nervous and Mental Diseases

Munson, speaking in 1900, states that the insanity rate is much lower for negroes, probably as a result of duller mind and less abuse of alcohol. For the decade 1890–1899, the admission rates were 1.41 for whites and 0.90 for negroes. My statistics for the last decade show that in the United States the average admission rate for negroes is a trifle higher than for white men (2.4 and 2.2), while in the Philippines the

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ratio is a little larger for white men (2.6 and 2.1). This latter difference, it will be seen, is due to a moderate falling off in the rate for mental alienation among negroes in the Philippines, as compared with those remaining at home, and to a considerable increase of insanity among white men serving in the Philippines. The excess of admissions for mental alienations among white soldiers in the Philippines, as compared with those serving in America, is about 20 per cent for the decade 1905–1914. This increase occurred chiefly during last four years.

If fair complexion predisposes to nervous diseases in the tropics, as is claimed by certain observers, one might expect that the negroes

TABLE X.—*Admissions per* 1,000 *for all Nervous Diseases and for Insanity for American Army in United States and Philippine Islands*, 1905–1914

Calendar year	United States				Philippine Islands					
	Insanity		Nervous diseases		Insanity			Nervous diseases		
	W	C	W	C	W	C	F	W	C	F
1905	1.6	1.5	19	20	1.5	x	0.9	21	x	7
1906	1.3	2.0	19	21	2.1	0	0.6	19	27	8
1907	1.7	3.8	20	17	2.2	0	0.9	18	28	12
1908	1.6	1.4	18	15	1.0	1.3	1.0	16	32	12
1909	1.6	2.0	17	12	1.5	1.7	0.0	17	20	10
1910	1.5	2.3	14	17	1.9	x	0.6	17	x	5
1911	1.6	2.7	13	19	2.0	x	1.0	20	x	5
1912	3.3	3.2	14	13	3.6	3.0	0.9	16	20	4
1913	3.0	1.2	13	20	5.1	3.3	0.4	18	13	5
1914	3.8	4.4	13	12	6.6	4.8	2.8	19	10	7
Mean....	2.2	2.4	15.6	17.0	2.6	2.1	0.8	18.0	21.4	7.4

would show a comparative immunity to neuroses on being transferred to the Philippine Islands. Such has not been the case in the last decade. Admissions for nervous diseases averaged higher for negroes than for white men both at home and abroad, as appears in Table X, but the rate in the United States is only 10 per cent higher for colored troops, while in the Philippines it is nearly 20 per cent greater. In the decade 1890–1899, the rates were lower for negroes, the figures being 57.86 for them and 64.53 for white troops.

In the case of Filipinos the rate for nervous diseases was less than one-half, and for insanity less than one-third of the corresponding figures for white men serving in the Archipelago.

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Respiratory Diseases

In the periods 1878–1887 and 1888–1897, affections of the respiratory tract were much more common among negroes, giving admission rates of 243.69 to 192.03 for the first period, and 106.36 to 95.74 for the second. During the last decade this class of diseases has been a little less prevalent among colored than among white troops in the United States, while in the Philippines conditions were reversed, negroes giving over 50 per cent more admissions than Caucasians. Filipinos stood intermediate, their admission figures being 54.3 as compared with 45.1 for whites and 69.6 for negroes stationed in the Philippine Islands.

Analyzing these figures somewhat for the last decade it was found that bronchitis, acute and chronic, was much more frequent among whites in the United States (39.5 and 33.9), and among negroes in the

TABLE XI.—*Admissions for Respiratory Diseases (All) and for Bronchitis, Tuberculosis and Pneumonia in American Army in United States, 1905–1914*

Calendar year	Respiratory diseases		Bronchitis		Tuberculosis		Pneumonia	
	W	C	W	C	W	C	W	C
1905	106	99	64	46	4.0	5.7	3.4	3.9
1906	88	51	50	22	4.3	3.1	2.5	4.4
1907	101	69	55	36	4.3	3.7	2.8	6.7
1908	74	52	36	29	3.3	5.5	3.1	5.5
1909	77	65	37	25	4.0	2.6	2.4	5.6
1910	64	79	33	27	2.9	1.3	2.5	4.4
1911	61	69	34	41	3.1	3.4	2.3	2.4
1912	64	48	38	33	2.9	1.6	2.8	3.2
1913	48	52	29	31	2.6	3.5	2.6	5.3
1914	56	58	35	43	2.3	3.3	3.1	5.5
Mean.....	71.0	67.4	39.5	33.9	3.2	4.0	2.7	4.3

Philippines (41.9 and 23.2). The rate for Filipinos was slightly below that for negroes serving in the Philippines. For the decades 1878–1887 and 1888–1897, however, it had been a more common cause of admission for negroes, 75.72 and 65.24 as compared with 65.53 and 62. 87 for whites. For the more serious pulmonary diseases the advantage was all with the Caucasian. Every year of the last decade showed a much larger admission rate for pneumonia and broncho-pneumonia among colored troops serving in the United States, and the average was nearly 75 per cent greater. In the Philippines the average admission rate of pneumonia both for negroes and Filipinos was more than double that for

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white troops in the islands. In every year except two in the Philippines and except three in the United States, the admission rate for tuberculosis of the lungs was much higher for negroes than for whites, the average for the decade in each country being about 30 per cent more. For Filipinos the rate was a trifle higher than for white men. The decade 1888–1897 gave results of the same character, admission rates for pneumonia being 3.39 among whites and 6.53 among negroes, and for pulmonary tuberculosis 2.45 and 3.54 per 1,000. In the earlier decade, 1878–1887, pneumonia was much more prevalent among negroes, 6.28 to 4.22, but the differences for phthisis were trifling, 3.64 for negroes as compared with 3.56 for white men.

The case mortality for pneumonia in the entire army for the decade 1905–1914 was 7 per cent for white men, 12 per cent for Filipinos and 18 per cent for negroes. In the period 1890–1899 it was 17 per cent for whites and 11 per cent for negroes.

TABLE XII.—*Admissions per* 1,000 *for Respiratory Diseases (All) and for Bronchitis, Tuberculosis and Pneumonia in American Army in Philippine Islands*, 1905–1914

Calendar year	Respiratory diseases			Bronchitis			Tuberculosis			Pneumonia		
	W	C	F	W	C	F	W	C	F	W	C	F
1905	44	x	63	26	x	46	5.2	x	5.5	1.0	x	4.4
1906	45	79	87	26	52	67	4.7	6.4	8.6	0.7	1.6	1.9
1907	52	96	69	32	63	45	6.3	3.3	4.3	1.2	8.1	1.3
1908	45	85	61	27	48	42	5.6	6.6	6.1	0.8	0.9	2.9
1909	43	72	62	24	35	43	4.7	4.3	5.7	1.2	0.9	3.5
1910	45	x	53	22	x	36	4.8	x	2.9	1.0	x	1.2
1911	42	x	32	3	x	22	3.6	x	2.9	1.2	x	2.5
1912	35	78	38	19	48	28	4.1	8.9	4.8	1.5	3.7	2.6
1913	48	46	50	28	25	39	6.0	7.1	6.2	1.3	2.8	3.1
1914	59	38	33	33	27	25	6.2	10.1	5.2	1.6	1.1	2.0
Mean...	45.1	69.6	54.3	23.2	41.9	38.9	5.0	6.7	5.2	1.1	2.8	2.5

The above findings as regards the prevalence of tuberculosis and pneumonia correspond with previous experience in civil and military life. In 1817, a regiment of West Indian blacks sent to the comparatively mild station of Gibraltar was almost destroyed by tuberculosis in fifteen months, showing the striking susceptibility of the negro when suddenly transferred to a colder climate. Hare considers that the negro and the American Indian are very susceptible to tuberculosis and that half-breeds are particularly prone to the malady. Gorgas (8) states that in the Rand mines 21,000 tropicals had a death rate from pneu-

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monia of 26.30 while 199,000 non-tropicals had a rate of 8. For the period 1906 to 1912 in the Panama Canal Zone Hoffman states that pneumonia caused 4.7 per cent of the total mortality among white American employes, 11 per cent among foreign whites and 26.9 per cent among colored men (18). Gorgas considers that continued exposure to pneumococcus infection gradually produces a higher degree of resistance on the part of tropical natives, as shown by an incidence rate on the Isthmus four and one-half times as great for the new "boy" (with less than three months' residence in Panama) as for the old. The same was found true in South African mines. A very striking fall in the death rate of pneumonia on the Isthmus was coincident with a cessation of crowded barracks life among negroes.

TABLE XIII.—*Admissions for all Venereal Diseases and for Syphilis in American Army in United States and Philippine Islands*, 1905–1914

Calendar year	United States				Philippine Islands					
	All venereal diseases		Syphilis		All venereal diseases			Syphilis		
	W	C	W	C	W	C	F	W	C	F
1905	181	154	30	26	306	x	60	55	x	7
1906	159	150	27	26	309	322	63	37	24	3
1907	167	179	25	23	277	494	63	43	50	4
1908	173	282	22	66	267	388	56	42	38	6
1909	176	217	26	38	290	418	49	48	23	4
1910	155	170	27	26	276	x	62	45	x	4
1911	165	143	45	26	305	x	58	78	x	5
1912	116	105	26	20	215	524	56	45	24	5
1913	85	106	21	21	141	194	36	32	38	4
1914	91	53	19	8	175	234	58	47	48	9
Mean...	142.9	147.4	26.7	25.5	270.2	364.2	55.9	47.9	37.5	5.1

That the question of crowded barracks and recent arrival in an endemic center of pneumococcus infection is not the only factor in the racial incidence of pneumonia appears probable in view of the greater prevalence among negroes in our military service in the last decade. The negro soldiers occupy the same barracks as do white soldiers, have the same air space, and have spent their lives in a country where pneumonia is endemic. Yet they show much higher rates than white men.

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Venereal Diseases

The influence at times exerted by race on the rates for venereal diseases is very marked. In the Dutch East Indies for the five-year period 1890–1894, the admissions for syphilis and for all venereal diseases were 43.6 and 424.7 respectively for Dutch troops as compared with 9.6 and 225 for native soldiers. In India the corresponding figures were 195 and 458.3 for Englishmen as compared with 17.4 and 37.5 for Indian troops. Munson considers that the relative immunity of the native of India is due in part to caste influences, but more largely to racial insusceptibility.

In the West Indies the percentage of veneral infection is much greater among colored troops than among British soldiers. For the years 1898 and 1899, gonorrhea was 50 per cent and syphilis over 100 per cent more prevalent among colored than among the white West Indian troops.

Formerly, in the Army of the United States, syphilis as well as all venereal diseases was decidedly more prevalent among negroes. During the decade 1878–1887, the admissions for all venereal diseases and for syphilis alone were 81.77 and 36.68 respectively among white, and 109.43 and 59.07 among black troops. In the next decade, 1888–1897, the corresponding rates were 70.19 and 13.93 for whites as against 73.11 and 16.74 for negroes.

During the last ten years in our service the figures are of special interest and value because for the major portion of the decade all troops, of whatever race, have been subjected to bi-weekly physical inspections made with a view of detecting cases of venereal disease which might otherwise be concealed from the military authorities. As shown in Table XIII the admissions for all venereal diseases in the United States have been slightly greater for colored troops, but the average difference was less than 5 per cent. In the Philippine Islands, however, the admissions for colored troops were nearly 40 per cent higher than for white soldiers. For Filipino troops the rate was very low, being less than one-fourth that of the white men. This is probably because a large portion of these men are married.

Turning to syphilis we find that during the last decade in the United States the admissions for colored troops have been lower in most years. The average for the decade is about 5 per cent higher for whites, but would be much greater were it not for the single year 1908, when the rate for negroes was three times that for whites. In the Philippines the admissions for whites averaged 30 per cent more than for colored troops. For Filipinos the rate was less than one-ninth that of whites.

As regards the prevalence of syphilis among negroes in civil life

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opinions differ. Most observers think it more common than among whites (9). Livingstone thinks syphilis dies out among pure negro tribes and that admixture of Caucasian blood increases susceptibility to the disease. Some consider that in America nearly every negro who reaches adult life is syphilitic, and a well-known New Orleans physician, now dead, divided negroes into three classes—those who have had syphilis, those who have syphilis and those who are going to have syphilis. The recent and exact studies of Vedder, based on clinical and laboratory researches, show indications of syphilis in 16 per cent of white, 36 per cent of negro and 55 per cent of Porto Rican enlisted men (10). Admissions for syphilis in the regiment of Porto Rican native soldiers in the last decade averaged about thirty-two per thousand as contrasted with five for Filipinos.

Diseases of the Digestive System

In the ten-year period 1890–1899, diseases of the digestive system were a little more common among whites, the proportion being 355.98 to 343.29. For the last decade in the United States digestive disturbances were considerably more prevalent among white troops than among the colored, while in the Philippines the reverse condition was found. For Filipinos the rates were materially below those for white.

As regards one of the most serious of the tropical digestive diseases, viz, dysentery, Johnson states that a race out of its own habitat is a greater prey to dysentery, owing to the adoption of a mode of life and diet unsuited to the necessities of the climate. He claims that the mortality is usually greater among the native populations. In our own service, during the past decade, Table VIII shows that the relative numbers of admissions for dysentery in the Philippines varied greatly from year to year, but averaged over 20 per cent lower for negro than for white troops. They were less than half as great for Filipinos. Death rates averaged per thousand for whites 0.4, for negroes 0.2, and for Filipinos 0.1, but the total numbers of deaths are too few to give the figures a great deal of value.

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(To be continued)

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ANOTHER VIEWPOINT OF OUR RED CROSS WORK IN SERBIA

By SHADWORTH O. BEASLEY, M.D.

Assistant Surgeon, American Red Cross, Serbian Unit No. 3

(Concluded)

(With one illustration)

WE had every variety of gunshot wounds from rifle bullets, shrapnel slugs, shrapnel fragments, hand grenades, and great contused lacerated pulpified wounds, involving the entire cross-section of a limb, caused by high explosive shells. Many patients would never have reached the hospital alive had it been necessary for them to travel further. We were in the unique position of being first aid, field and base hospital, all in one, in the center of a terrific bombardment. We had many penetrating wounds of the chest from which the patients recovered without any trouble and without any operation. A few penetrating wounds of the skull, the bullet track directly involving the brain, recovered; but they were usually those in which the brain was not laid open on the surface of the wound. In all cases but one, I think, where there was much brain tissue exposed on the surface of the scalp, death resulted. In this case, a large wound of the temporal region, laid open the skull and lacerated and contused the temporo-sphenoidal lobe extensively; but the patient was well on the way to recovery when we left. Those abdominal cases in which the patient looked pretty well we left alone, and many of them recovered; those which looked very badly and in which there was abdominal distension, or the abdomen seemed to be full of blood, we opened up and usually found the intra-abdominal condition almost hopeless; the intestines were often torn severely and in several places and the blood vessels were found bleeding freely. These cases almost, if not quite, all died. It is very questionable how much time one is justified, under circumstances such as these, when help is short handed, in spending upon laparotomies on cases which seem to be hopeless, when there are many other wounded needing immediate urgent assistance, whose lives can be saved by timely aid. Abdominal work takes so much time and saves so few, that these facts must be considered where the wounded are so numerous.

We had a large number of amputations, as many wounded were so horribly torn by high explosive shells, which pulverized extremities when struck by large fragments, or by the shells before they exploded. We had the good fortune to have an ample supply of splints, I believe, of German and Austrian make; these were of very great service to us; they were all sorted out in piles, and there was no

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time lost in hunting for a suitable splint for any kind of a case, no matter how extensive the injury. This was a very important matter as it saved an immense amount of time and labor. Some of these splints were most ingenious.

The wounded who came in from the surrounding hills were often in the most pitiable condition. They had in some cases laid for three or four days, where they fell, without food or water, before being dressed; and after being dressed, in field hospitals, had been left in cottages until the roads became sufficiently relieved of the congestion, caused by forward moving transportation, to allow of the wounded being brought to the rear, that is, to Belgrade. The amount of pus in these cases was terrible. It seemed at first unbelievable that men could hold so much pus in their bodies and still live. The foul odor was intense from their wounds; the pus seeped through the plaster casts which the Germans had applied in the field hospital, and when the casts were cut off they were full of pus, and the superficial layers of the skin was macerated and came off, leaving the underlying skin raw and inflamed. It was remarkable how rapidly most of these pus cases improved, and the pus receded in volume, after the tissues had been thoroughly opened up, drained and irrigated for a few days.

We had a good many cases of gas gangrene. These, if possible, were amputated high up, as we did not have the help to carry out continuous irrigation or do the very frequent dressings that the more conservative methods of treating gas gangrene require. We had to do that which would save the most lives and then limbs. In these amputations we left the flaps wide open, packed with gauze, and applied a copious dressing. The great majority of these did well. It was interesting to see how much work a man could do with little assistance when hard pressed. I believe a mechanical apparatus easily might be devised, which could be fastened to a table and assist very greatly in holding the limb of the patient in position, in amputating thighs, when so short-handed as we were, and I think this would be of a great deal of assistance. Every doctor and nurse were constantly busy operating and doing dressings, during the bombardment and the time following it, so, unfortunately, there was no time for making notes, or any valuable study of this vast material and, indeed, it must always be, that the best surgical lessons will be learned in the base hospitals and not where the rush of work is so stupendous.

The odor from soiled bedding and unwashed bodies, etc., became terrible after the water supply was cut off from us; and the Austrian Medical Corps, which had taken over the hospital, failed to deliver water to us, or even receptacles in which to collect water off the roof. After

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the town had been occupied by the Austro-German armies, the Austrians took over our hospital, but for some reason they had very few medical officers and, I think, it was not until the third day after the complete occupation by the Austrians, that their surgeons volunteered to assist us. In the meantime the Austrians were sending the largest part, if not all, of their wounded to us and we had taken care of great numbers of them, as the Serbians had inflicted very heavy loss upon them. The Germans took care of their own wounded and had apparently every facility, both in men and equipment, for doing so. As I have said, we were handicapped very greatly for want of help, both in quantity and quality, when the great rush of wounded came, our nurses and some Serbian women nurses being the only efficient help we had.

I do not think that any hospital, arranged for surgical work in time of peace, is really suited to care for the vast numbers of freshly wounded, expeditiously and without an unnecessary amount of handling of the cases. It seems to me that military or civil hospitals, especially designed for caring for the immediate needs of great numbers of wounded, arriving within a short period, are almost a necessity for the proper care and accommodation of these cases. As a large portion of such a hospital would be quite useless in time of peace, it would seem possible that the additional parts of the building, necessary, might be supplied on demand, by the addition of previously prepared galvanized iron and wooden structures, which could be rapidly assembled and adjusted to already existing buildings, where there was room for such additions. The plans for each hospital whose facilities it is proposed to extend, should be prepared in time of peace, and the contracts made with some firm or firms to turn them out and erect them accordingly, immediately on receiving instructions to do so from the proper authorities, when it became necessary. Every precaution should be taken to provide hospitals which are to be erected in towns liable to siege, or in areas subjected to destruction by gun fire, with their own source of supplies of electricity for lighting, of heat, water and ice. The water should always be stored in well-built cisterns, divided into sections and situated well below the ground, heavily protected overhead. There should be cisterns arranged for collecting water from the roofs of such buildings should rain be falling. There must be more than one cistern, as such are apt to be destroyed by the fire of the enemy's guns. Had we such a system both for lighting, water, heat and ice, the necessary comforts for the patients and the working staff would have been very different from what they were, for a considerable period of our work in Belgrade, after the bombardment had commenced.

I wish to submit a few suggestions in regard to the arrangement of

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an annex to a hospital which is to be converted from peace to war time use; and which could also be used in a hospital built expressly for war purposes. This scheme is not a fixed idea, but simply a suggestion to hospital architects, to be incorporated in the plans.

The following suggests the space and arrangement of rooms, required for military hospitals situated in a fortress town or in a city or locality in which vast numbers of wounded are apt to be brought from positions which, probably, can be held against the enemy for a considerable time.

The idea of this plan is simply to give an outline of the general arrangement of a hospital to receive large numbers of freshly wounded; but any part of the plan can be modified to suit the particular requirements of any hospital, which may be required for war purposes.

1. Is a large covered way under which the ambulances will discharge their patients without exposing them to the inclemencies of the weather; the patients are carried from the ambulances on the ambulance litters into room No. 2.

2. This is a very large reception room, well lighted and heated; it is sufficiently large to receive at least 300 patients. The patients here would be transferred from the ambulance litters to a metal litter, so constructed that it has a smooth surface with tight joints and perforated with large holes so that water would run off immediately from its upper surface, and that it may be easily washed and sterilized. These movable litters are to rest on four standards, fixed on the floor, about 4 feet high, so that the patients can be easily handled on the litters. There should be an allowance of four or five litters for each set of standards so that, when the litter is removed with a patient upon it to the next room, another litter can be placed on the standard for the next patient. After a time, the first litter to leave the standard will be returned from the operating room; but, as in most cases, the more seriously wounded patients will remain on the same litter until they finally reach the operating room after having passed through the various cleansing rooms; there must be enough litters for each standard so that each set of standards can be in constant use, should the numbers of wounded require it. The space between the rows of these litters is to be sufficiently ample to enable the orderlies to work freely and easily, and so avoid irritation and delay.

In this room, also, there should be benches with arm and back rests, for ambulatory cases; not more than four seats, two back to back, should be on each bench, so as to enable the assistants to have easy access to each case. There should be in this room a surgeon whose duty it would be, to select the cases, as far as possible in the order in which

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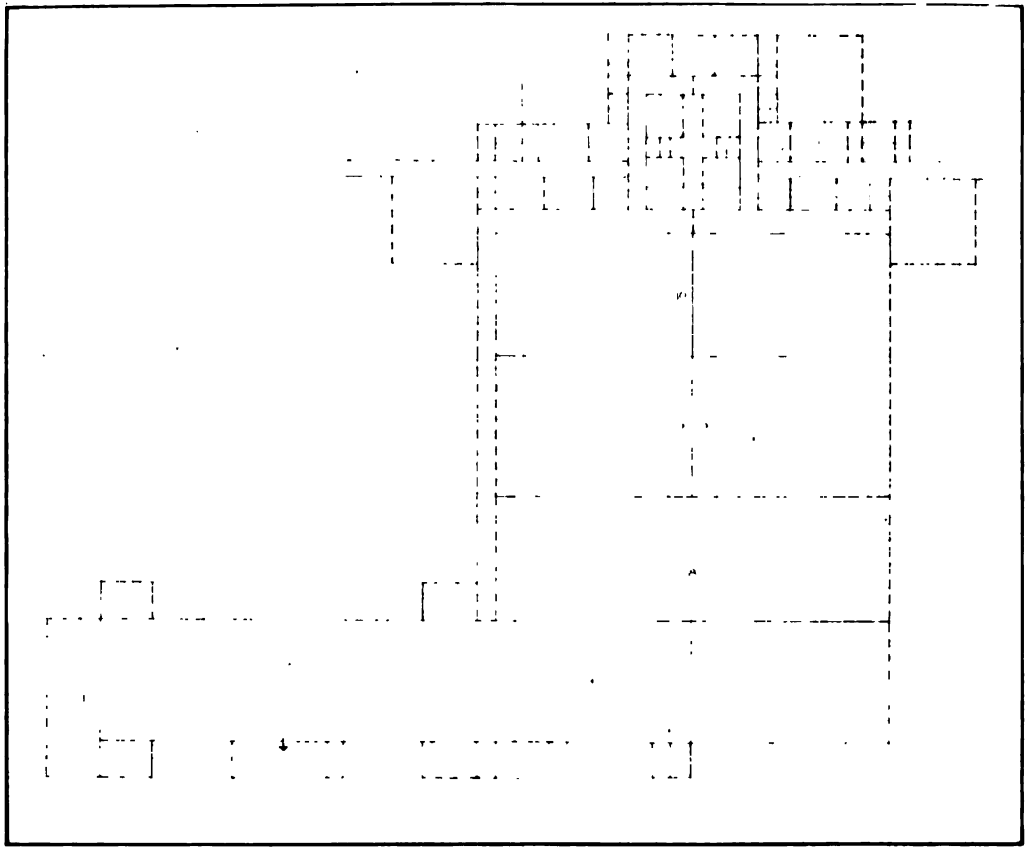

PROPOSED ANNEX TO A HOSPITAL FOR WARTIME USE.

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they should receive attention and to tag them, making a few notes on a history sheet, held in some sort of frame which will keep it clean and protect it from water. This history sheet must in some way be easily kept with the patient and not lost.

In this room will be applied hasty emergency dressings, if they have not already been applied. Facilities will be provided for patients to attend to calls of nature, such as urinals, bed pans, etc. There are four toilets directly connected with room 2, as the plan shows. There should also be small steam sterilizers which are now made for sterilizing bed pans, etc.; the necessary slop sinks must also be convenient for cleansing the above articles quickly and easily. Here the proper nourishments, narcotics, medicinal stimulants, etc., are given to those patients requiring them.

From 2, there is an entrance to room 3, which is a well-equipped dressing room for those who are lightly wounded, who require just simple dressings and who can then immediately leave the hospital for other destinations. Patients, except the most lightly wounded, who can be helped by medical and surgical attention, are then transferred on their litters from room 2 to room 8. (On the diagram No. 8 is divided into two rooms—the one on the left being for clean patients, the one on the right for pus cases.)

3. This is a well-equipped, large surgical dressing room to be used for dressing very lightly wounded, who can then walk away and proceed elsewhere or return to the front, etc. There must be an exit from this room which does not lead back into No. 2.

4. This is a kitchen for the preparation of stimulating foods for the wounded.

6. This is a room in which the hopelessly wounded, who are already moribund, are permitted to die in peace. Here the necessary morphine, etc., can be given and they are not disturbed. This, of course, is only for those who are expected to die in a very short time.

5. Two small chapels for Catholic and Protestant clergy.

7. This room opens from No. 6 and is a morgue for those wounded who die very shortly after being brought from the ambulance, or who died in the ambulance.

8. Patients are carried from No. 2 to No. 8, which, as before described, is divided into two apartments—one for clean cases and the other for pus cases. This separation can only be roughly judged. Here the clothing will be removed and as it will nearly always be badly soiled, it is put into a bag marked for identification and sent to a uniform sterilizing department and from there to a laundry and dry cleaning department, where it will be cleansed, and then sent to a magazine to be stored for later use.

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Old and filthy dressings should be removed in this room and temporary clean ones applied. The patient should be wrapped in blankets and his hair clipped. In this room, as in all the others, except the operating room, will be the necessary toilets, urinals, bed pans, etc.

9. If the patient's condition is suitable he is then sent to No. 9, clean or pus. From room 2, if the case is very urgent, he will be sent directly to the designated operating room without first being bathed. Two such operating rooms are seen at each end of the wide corridor beyond No. 10. Rooms No. 9 and 10 must have intelligent orderlies and noncommissioned officers doing the work of bathing and cleansing.

(*a*) For slightly wounded use in bathing, showers and hose. All the body, except the actual part wounded, is to be washed, and the wounded parts can be easily and well protected by applying rubber dams about them.

(*b*) For clean cases, seriously wounded. The warm blankets are removed while the patient is still on the metal litter, as much of the body as possible is washed down with hot water, and dried and warm blankets placed upon it.

10. Warm drying apartments where the blankets are removed and patients covered with suitable flannel garments and blankets; hot water bottles applied, etc. Here there must be a large assortment of night clothing, pajama jackets with one arm only, pants with one leg only, etc., etc., so that patients can be covered up with the least possible manipulation and still leave the wounded part uncovered.

From No. 10, the patients are sent across the wide corridor to the various operating rooms, according to the nature of their case, which has been determined previously.

This plan of the operating pavilion provides for X-ray rooms, anesthetic rooms, operating rooms for cases requiring large plaster casts, large sterilizing room, large operating rooms, two great emergency operating rooms, splint and supplies rooms, rest rooms, toilets, etc., for patients, surgical staff, female nurses and male orderlies, and diet kitchens for the same. These rooms are so arranged that the obviously pus cases can be treated separately from the obviously clean cases.

Of course an adherence to this segregation will not always be possible under the circumstances for which this hospital is designed. It may very well be that, at times, nearly all the work may consist of infected cases and the staff will have to learn to accommodate itself to changing conditions. In the left hand corner of the cut is a little diagram of the arrangement of the tables for operating and instruments, dressings, etc., which will be found useful, where there are

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hundreds and hundreds to be treated in a short time. Some such arrangement will save a great deal of confusion.

One must change one's whole idea about the time and conveniences one is used to having in the handling of wounded in civil life, when one comes to deal with the handling of hundreds of wounded in a short time, during or after a great battle. Every surgical ward should have a large surgical dressing room, for the secondary dressing of most of the wounded, as the amount of pus is so great and the cries of pain of the wounded are so harrowing, that I think it is unwise to have this constant source of shock acting on those wounded who have not yet been dressed.

CONSOLIDATED WEEKLY REPORTS OF SICK AND INJURED, SOUTHERN DEPARTMENT, U. S. ARMY

1916 for week ending	Troops	Mean strength No.	Per cent of sickness	Per cent of sickness last report	Dead		Transferred No.	Actual No. of cases of					
					Disease No.	Injury No.		Diarrhea	Dysentery	Malaria	Typhoid	Paratyphoid	All other causes
November 25.....	Regular	45,000	2.53	3.01	1	1	199	19	19	42	8	14	1,660
	Militia	97,000	2.50	2.46	1	3	433	33	15	176	19	51	3,572
December 2.....	Regular	45,000	2.47	2.53	6	1	143	18	27	33	8	10	1,631
	Militia	97,000	2.21	2.50	3	4	398	19	16	164	18	44	3,575
December 9.....	Regular	45,000	2.66	2.47	1	2	274	14	34	23	11	6	1,745
	Militia	97,000	2.71	2.21	7	2	326	21	13	119	12	27	4,382
December 16.....	Regular	46,933	2.51	2.66	5	2	235	12	20	19	5	6	1,749
	Militia	95,970	2.69	2.71	13	1	534	10	15	86	12	16	4,690

The increasing number of deaths, though the rate is low, provokes inquiry. It appears that of the five deaths from disease in the Regulars, reported December 16, one was due to typhoid, one acute alcoholism, one pyemia and one cerebral hemorrhage. Of the thirteen in the Militia, six were due to pneumonia, one meningitis, one tuberculosis, three cerebro-spinal fever, one diabetes and one toxemia.

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THE PROPHYLAXIS AND TREATMENT OF TETANUS

By First Lieutenant ALEXIUS McGLANNAN
Medical Reserve Corps, United States Army

A SHORT review of the life history and action of the tetanus bacillus will show the reasons for the methods of prophylaxis and treatment to be described.

The organism is a spore bearing anerobic bacillus. The spores are extremely resistant and unusually virile. Undoubted proof exists of the persistent virulence of spores dormant for several years, especially when protected from sunlight and similar influences.

Recent investigation by Noble (1), shows that the bacillus occurs in the intestine of many herbivorous animals, especially in horses. Further, Noble states that the organism may multiply in susceptible animals. In the case of one horse the animal proved a tetanus carrier, the organisms remaining in the feces for a period of four months, although they disappeared from a control animal in fourteen days. This work explains the source of contamination of soils, street dust, fresh vegetables, and of the clothing and skin of those who work about stables and animal shelters.

The dust of old walls and of cellars usually harbors tetanus spores, probably a secondary development from street or soil dust. The wad of a blank cartridge is usually infected, also some forms of felt and various fibers occasionally used in the manufacture of dressings or fixation material for wounds.

The spores resist disinfectants and antiseptics, and it is necessary to use high temperatures persistently in order to sterilize contaminated material. Of chemical disinfectants chlorinated lime, phenol and iodoform have all been found useful.

When a susceptible animal is inoculated with tetanus, the organisms produce a toxin at the site of the inoculation. From this point the toxin travels by way of the nerve fibers, to reach the spinal cord and through the cerebro-spinal fluid, to the brain. Some absorption into the circulation also occurs at the focus of entry, and there is an accumulation of toxin in the blood. The effect of the toxin is borne by the cells of the central nervous system, and the symptoms of tetanus are the result of this action. Death usually results from a combination of two causes, overwhelming toxemia and exhaustion from the exertion of the convulsions, added to the loss of nourishment brought about by the dysphagia.

The prophylaxis of tetanus therefore begins with the recognition

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of suspicious wounds. Such wounds should have appropraite local treatment and the patient should always be given a preventative dose of tetanus antitoxin, usually 1,500 units as soon as possible after the injury. Reports from the war indicate that smaller quantities, as low even as 20 units, may be sufficient. Forty-eight hours seems the limit of time for certain protection. This injection should be given into or around, the principal nerve supplying the region of the wound, between the wound and the spinal column. Exposure of the nerve in an open wound, for the purpose of making the injection or for drainage, seems unnecessarily radical.

Suspicious wounds are those inflicted in any of the ordinary habitat of the tetanus bacillus, especially deep punctures and wounds having much contusion and laceration. Wounds which involve the more compact tissues, as tendon and aponeurosis, are particularly susceptible to tetanus infection, especially when such wounds are gangrenous.

Saprophytic and pyogenic bacteria contaminating a wound may assist in the development of tetanus by using up the oxygen (2).

The onset and severity of tetanus bears no relation to the size of the wound. A fatal infection may follow a superficial abrasion.

Of interest to the military surgeon is Walther's observation that tetanus is rare after rifle wounds and common in shrapnel injuries. Also Czerny's report of four cases of tetanus that developed during the journey back from the firing line, in which the infection was attributed to contamination from the cars. These cars had been used for transporting horses to the front and were not cleaned before loading the wounded for the return journey. This report shows a route for infection that might easily be overlooked in the stress of a campaign.

Infection by contact is possible. Therefore tetanus patents should be separated from other wounded as far as can be, while those wounded that are necessarily companions of the tetanus cases should be given a protective injection. Contact of the wounded with straw, etc., should be prevented by spreading a tent or blanket under the patient.

The local treatment of a suspicious wound varies with its character. When feasible, complete excision of the focus is advisible. Deep punctures should be laid open and all the wounds should be disinfected and given free drainage. It is important that the wound surface be kept moist and free from drying scabs. For this purpose some oily dressing, such as Balsam of Peru, is valuable. The exposure of the wound to a current of oxygen or air has been recommended, but is seldom practicable.

Of the local antiseptics, phenol is the time honored agent. It has a vigorous bactericidal action, but its caustic properties make it difficult

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to handle and control. Bleaching powder in some modification is now being used in Europe. A 10 per cent mixture of this agent and some inert mineral powder is advised as a dusting powder. Carrell's chlorinated lime and boric acid dressing seems a better way to apply this agent, because impermeable crusts are less likely to be formed.

Kitasato's experiments with iodoform proved the antagonism between this drug and the tetanus bacillus. The efficacy of the drug seems to lie in the gradual liberation of iodine from the impregnated tissues. Other iodine derivatives have the same action.

The value of iodine as a disinfectant of wounds is disputed by many observers, although the almost universal adoption of this agent in civil surgery seems to prove its usefulness. Tinker shows that iodine applied to the tissues will not destroy contained spores and therefore it should be useless in the prophylaxis of tetanus. On the other hand, we have the work of Kitasato showing the value of iodoform and the usual explanation of its action.

Without attempting to reconcile this difference of opinion, we may consider some of the advantages of iodine in the treatment of an infected wound.

1. It is practically non-toxic and therefore may be used freely.
2. It is not a caustic and does not sear the surface of the wound.
3. It will prevent the growth of ordinary pyogenic organisms.
4. It produces a marked and long sustained local hyperemia. This last is probably its greatest value.

The treatment of the wound, however, is not so important as is the prophylactic injection of antitoxin. If one or the other must be postponed, delay in the wound treatment is the lesser evil. This point is of great importance in military surgery. Wound treatment beyond the simplest first aid is rarely possible for many hours or even days after the occurrence of the injury. The injection is a simple procedure, and with a sufficient supply of antitoxin available, could be carried out at the advanced dressing station and at the station for the slightly wounded.

Aschoff and Robertson (3) recommend soaking absorbent cotton in antitoxin and drying it. This impregnated cotton may be applied to large wounds and when it becomes moistened by the secretion, the antitoxin is liberated into the tissues. The possibility of utilizing this device is invited to the attention of the recently organized First-Aid Conference.

On account of the frequent persistence of the tetanus bacillus in the tissues, the protective action of the serum is limited to a period of

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ten or twelve days. If the wound has not entirely healed in this length of time, the injection should be repeated (4).

For the same reason it is necessary to administer a prophylactic dose before operating on sinuses or the wounds of those patients who have been exposed to the infection.

The treatment of tetanus aims to provide for six conditions:

1. The neutralization of the toxin in the cerebro-spinal fluid and in the blood.

2. Limiting or preventing the development of toxin at the focus of infection.

3. Interruption of the flow of toxin from the wound to the central nervous system.

4. Preservation of the nutrition of the patient.

5. Prevention of convulsions by protecting the patient from external stimuli.

6. Control of convulsions by abolition or obtunding of reflexes.

The first condition is met by the injection of antitoxin into the spinal canal and intravenously. Ashhurst and John (5) outline a method of treatment, which has been modified by the work of Park and Nicoll.

Ten to fifteen thousand units of antitoxin are given intravenously, and 5,000 units into the spinal canal. The spinal injection is given through the needle which has made a preliminary lumbar puncture. Should the spinal fluid be under increased pressure, a rare occurrence, a quantity equal to, or greater than, the volume of the antitoxin should be removed before making the injection. When the symptoms are marked, ether anaesthesia may be required for making the puncture.

There is a difference of opinion regarding the management of the wound after the disease has developed. On the one hand, excision is advised for the purpose of removing the focus; on the other, it is condemned on the ground that such an operation only opens up new avenues for dissemination of toxin and bacteria.

The best method seems to be non-interference unless the wound clearly requires opening for drainage and disinfection. Occasionally it may be well to make injections of antitoxin into the tissues around the wound. Hydrogen peroxide, oxygen spray, etc., have no specific value in treating the wound.

For the third condition intraneural injections of antitoxin are efficacious. Such procedures as section of all the nerves from a limb, bringing the peripheral ends out of the wound for drainage, are unnecessary and unduly radical. The same seems true of the introduction of drainage tubes into the nerve.

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It is better judgment to refrain from all avoidable traumatism and to rely on the antitoxin introduced into the cerebro-spinal fluid and the blood, for combatting the toxin.

The nutrition of the patient is of extreme importance. As long as he can swallow without difficulty, this is a simple matter. When dysphagia is present, and when the spasm of the jaw muscles keeps the mouth tightly closed, the problem becomes difficult. Nutrient enemas help for a short time, but every effort must be directed toward the relaxation of the spasm.

Morphia hypodermatically is most useful in early cases, where spasm of respiration and deglutition are often the only symptoms. Chloral hydrate, in doses sufficiently great to produce a distinct stupor, is valuable, but the large doses necessary, 20 to 25 grams daily, are not without danger.

Magnesium sulphate intraspinously is valuable (6), but not free from danger on account of paralysis of respiration. Subcutaneous injections of this drug are easier to give but are also somewhat dangerous. A 20 or 30 per cent solution is used, and beginning with 5 c.c. the dose is gradually increased until diminished reflex activity is produced. A 5 per cent solution of calcium chloride, or some 1/60 grain eserine tablets, should be available as an antidote.

After the injection, the spasms usually relax in about an hour and the effect of the drug lasts about 6 or 8 hours. The injections are repeated as soon as symptoms return. Tightness of the chest and difficulty in swallowing are usually the earliest signs of returning convulsions. Magnesium glycerophosphate has been advised, in place of the sulphate, in the hope of overcoming some of the bad effects of the latter salt.

All manner of desperate means have been advised for control of the spasm of respiration. Section of both phrenic nerves was successfully done by Jehn (7), for the relief of this spasm. Intertracheal insufflation should be kept in mind as a means for supplying air without respiratory movement.

Bacelli's phenol injections have received few reports in the war literature. The method has been used by several civilian observers in the last five years, but the results of this treatment are not as good as those of the serum method.

The results of intraspinous and intravenous administration of antitoxin, far surpass those of any other form of treatment and whenever antitoxin in sufficient quantity is available, this should be the method of choice for treating tetanus. With a scarcity of antitoxin, the intraspinous dose should be given rather than the intravenous.

Magnesium sulphate injections are valuable in military surgery

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because this agent is cheap and is usually available. The prolonged abolition of reflexes may permit the comfortable and safe transportation of the injured man to a base hospital. Combined with a dose of opium, this seems the best preparation we can give a tetanus patient for exposure to external stimuli, when the exposure becomes necessary. The symptoms of tetanus are aggravated by rapid travel; therefore the hospital train should not go faster than 20 miles an hour (8).

As is true of all infections, the efficacy of the treatment of tetanus varies directly with the period of the disease at which it is instituted. Early diagnosis and prompt treatment give the best hope for success.

The early symptoms of tetanus are not marked but are quite distinct.

Pain and stiffness in the muscles of the region of the wound may be mistaken for a simple myalgia, but this is easily differentiated by exaggeration of the local reflexes, which exaggeration becomes progressive. Twitching and stiffness of the muscles, when these are tapped, is an evidence of increased excitability.

Pain about the mouth, fatigue on chewing and slight difficulty in swallowing, without any cause for this condition evident in the throat, are early and very certain signs, in a suspicious case.

Cramps in the chest muscles, generally described as a stitch in the side, and a sense of tightness in the chest, are other early symptoms.

Profuse sweating and a rapid pulse precede the onset of distinct lock-jaw.

Starting at noises, at lights or in draughts, is evidence of undue reflex sensitiveness, and if occurring in the wounded, should give rise to a strong suspicion of tetanus.

In the presence of any of these signs, the patient should be placed in the best surroundings possible, for quiet and darkness. The intraspinous and intravenous injections of antitoxin given as soon as possible, and the general nutrition preserved by frequent feeding of small quantities of easily digested food. Water should be given by rectum as well as by mouth, in as large quantity as can be taken. The spasmodic or paralyzed bladder may require catheterization and enemas may be necessary for emptying the bowels. Whatever manipulations are required must be carried out with the utmost gentleness, and be preceded by the administration of opium, if they annoy the patient. Every effort must be used to limit the effect of external stimuli on the central nervous system.

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THE TOXIC EFFECT OF EMETINE HYDROCHLORIDE

By Captain HOWARD H. JOHNSON
Medical Corps, United States Army
AND
First Lieutenant JOHN A. MURPHY
Medical Reserve Corps, United States Army

EMETINE hydrochloride has been used as the principal remedy in the treatment of 142 reported cases of entamebic dysentery at this hospital[1] since July 28, 1916. It has performed all that could be expected of it as a specific remedy in the treatment of entamebic dysentery, especially in the acute stage, and we have found its use, results, and dangers, somewhat analagous to those of salvarsan in syphilis. The toxic effects here reported are the first seen by us in the use of emetine, though we have used it in larger doses over longer periods than here recorded.

We have to report the death of two men under treatment for entamebic dysentery, who died from peculiar and unusual conditions in no way connected with the disease from which they suffered, with five other cases which showed physical signs and symptoms which we have reason to believe were due to emetine.

In the past three years emetine has been used in all parts of the world and to a very considerable extent in the treatment of entamebic dysentery, pyorrhea alveolaris, and various other conditions among which was bacillary dysentery, in which it was found to be useless. It has not yet earned a well-defined reputation for toxicity or mischievous effects and no particular warning has been sounded as to the dangers in its administration.

Levy and Rountree, in the *Archives of Internal Medicine*, 1916, write of the toxicity of various commercial preparations of emetine hydrochloride, describing two cases with one death, following 29 grains in twenty days. The symptoms were diarrhea, muscular weakness, and renal insufficiency. One case, an anemic woman who received 2 grains in four days, showed diarrhea and toxic delirium. They quote from the work of others, that the electro-cardiograph shows ventricular fibrillation in emetine poisoning. Of the twenty cases of poisoning they have collected, six had received less than 10 grains each. The symptoms were diarrhea with blood in four cases, diarrhea in three cases, peripheral neuritis in five cases, muscular paralysis in one case, purpuric eruption in one case, and toxic delirium

[1]U. S. Army Base Hospital No. 2, Fort Bliss, Texas.

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in one case. They think that 1/3 grain three times a day for ten days is a a safe dosage, and that such courses should be at intervals of several days or a week. Balfour and Pyman, "Toxicity of Emetine," *Journal R. A. M. C.*, 1916, believe it useless, unwise, and wasteful to subject patients to repeated long-continued courses of the drug. We know very little of the cumulative effect of emetine. There may be none, but in any case two short courses of the drug in appropriate doses will usually suffice to cure a case of amebic dysentery.

This would necessitate a primary administration in all of from 10 to 15 grains. Thomson and Thomson, *British Medical Journal*, July 24, 1916, recommend nothing less than 7 grains, and if necessary 18 to 20 grains. They do not mention toxic effects. Lieut. Col. Sir Ronald Ross, in the *Lancet* of January 1, 1916, states that the practice in India has been to give emetine not only for weeks but for months, and that he had heard of cases that had received 100 doses or more. He says further that, owing to three deaths in cases of dysentery without any obvious cause, suspicion was roused that the deaths had been due to heart failure owing to cumulative effects of emetine. He doubts whether the deaths were in any way attributable to emetine. One case in which emetine was suspected died after having received 15 grains, or what is considered by Sir Leonard Rogers to be a single lethal dose. Maj. R. Markham Carter, I.M.S., *Ind. Med. Gazette*, March, 1914: even after week's injection and apparent cure by emetine, there was in some cases a tendency to relapse. Indian officers are not inclined to admit that emetine is at all cumulative or pernicious in its results. He recommends ten-day periods of administration after which it should be remitted. He notes fatty degeneration of the heart in these fatal cases, but no more than is found in any grave illness. The dose of emetine for an adult should be at least a grain a day, and in some cases the drug should be pushed without hesitation. He says that small doses do harm as they sensitize the residual source of undestroyed ameba in the gut wall so as to render them emetine proof.

Dr. Nathan Barlow, in the *New York Medical Journal* of October 28, 1916, writing from Spanish Honduras, recommends 1 grain daily for at least ten days and considers relapse inevitable if used less than nine days. The British authorities recommend twelve days. The plan which he considers best is one grain or more (for one or two days), given daily for fifteen days, followed by 60 to 80 grains of ipecac for from fifteen to twenty days. If later positive for ameba or cysts, treatment is repeated.

Pellini and Wallace have done some experimental work in the "Pharmacology of Emetine," which they report in the September

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number of the *Journal of American Medical Sciences.* Their conclusions are: (1) Emetine depresses the heart and finally may paralyze it. (2) It is a powerful gastro-intestinal irritant, whether given by mouth or subcutaneously. (3) It causes a definite derangement of metabolism, characterized by increased nitrogenous loss and acidosis. (4) While in normal individuals and given in moderate doses these actions may not be of importance, in pathological states of the circulations, intestinal tract or metabolism, they may be a definite source of danger.

Hare states in *Practical Therapeutics,* thirteenth edition, pages 303 and 304: the drug acts as a *depressant to the spinal cord* (Pecholier), and it also depresses the heart if given in large doses and retained by the stomach long enough for it to be absorbed. Ipecac is eliminated by the kindeys and gastro-intestinal membrane, and the skin (Binz). If emetine is given in lethal doses to one of the lower animals, death is due to failure of respiration.

Potter, twelfth edition, page 322—Emetine possesses strong constringent action on the blood vessels and is a powerful emetic and expectorant. It causes death in animals by cardiac paralysis, and the autopsies show evidence of gastro-intestinal irritation and *hyperemic lungs with patches of hepatization.*

Dispensatory, nineteenth edition (Wood), page 675—both cephelin and emetine are powerful emetics, and in overdoses poisons. They have been found in the lower animals to be powerful *depressants of the motor side of the spinal cord* and to *kill by a centric paralytic asphyxia.* They are also depressant to the heart itself.

In the study of the following cases which have in our opinion shown the toxic effects of emetine, a general motor weakness has been noted and in cases 1 and 2, a decided vagus effect was evident. Quoting from the works of Kirke (Halliburton), twentieth edition, and Howell, sixth edition; we find the following; Kirke, page 527—stimulation of the vagi gives rise to *peristalsis of the esophagus.* The cell stations of these fibers are in the ganglion trunci vagi. Division of both pneumogastric nerves gives *rise to paralysis of the esophagus,* and stomach, and firm contraction of the cardiac orifice. These nerves, therefore, normally supply the *esophagus with motor,* and the cardiac sphincter with inhibitory fibers. If food is swallowed after these nerves are divided it *accumulates in the gullet* and never reaches the stomach.

Howell, page 581—the inhibitory fibers of the heart form a part of the outflow of bulbar autonomic fibers (page 255) through the vagus nerve.

Kirke, page 247—section of one vagus causes *slight acceleration of the heart,* this result is better marked when both vagi are divided.

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Howell, page 689—the special relations of the different fibers of the vagus to the center (respiratory), although the sensory nerves in general exert a reflex effect upon the respiratory center, experimental work has shown that the sensory fibers distributed along the respiratory passages, from the anterior nares to the alveoli, have a specially important relation to this center. The fact is most clearly shown in the case of the sensory fibers of the vagus, which are distributed to the lungs themselves. If the two vagi are cut in the neck the respiratory movements are at once altered in character; they show a much slower rhythm and greater amplitude. The inspiration especially are deeper and longer, with something of a pause at the end. Experiment has shown that this influence consists in the *tonic action* of the sensory fibers contained in the vagus and distributed to the lungs.

Kirke, page 316—still respiration continued after the vagi are cut. The character of the respiration becomes altered, especially if both nerves are severed; it is slower and deeper. This is due to the cessation of the impulses that normally run up the vagi through the respiratory center. The animal, however, lives a considerable time; a warm-blooded animal usually dies after about a week or ten days *from vagus pneumonia*, due to the removal of *tropic influences from the lungs*. Cold-blooded animals live longer, they exhibit fatty degeneration of the heart muscle also.

In recalling to mind the toxic effects of emetine it is desired particularly to emphasize the effects upon the motor cells and centers, upon the lungs (hepatization), and upon the heart. In the quotations from Kirke and Howell we have been struck by the similarity of vagus section and the conditions which occurred in Case Nos. 1 and 2, *i.e.*, (1) Inability to swallow after food had reached the esophagus, (2) hepatization of the lungs and (3) rapid and uncontrolled action of the heart.

The histories and the post-mortem reports are as follows: Case No. 1: age 22 years, bricklayer by occupation, admitted to Base Hospital No. 2, Fort Bliss, Tex., August 2, 1916, with diarrheal attack, which was proven to be due to infection with the entameba histolytica. The family and previous personal history have no bearing on the case, except in as far as this man was a resident of Michigan who had been in El Paso but two weeks prior to his infection.

Condition previous to admission: Diarrhea five days prior to admission; onset sudden, with cramps and bloody stools; temperature 101, pulse 112; temperature varied from day to day from 98 to 102, and the pulse rate varied from 80 to 108.

August 9, 1916: diagnosis of entamebic dysentery made.

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August 10, 1916: emetine grains ½ b.1.d., continued to August 16, 1916.

The stools decreased in number during this period, with a morning temperature normal and a slight afternoon rise to 100 on two days.

Nine days of emetine in daily doses of 1 grain resulted in a normal temperature and pulse.

August 21, 1916: the stools increased in frequency and continued so for several days, with a laboratory report alternating from positive to negative.

August 21 to 24: emetine grains 1/3 t.i.d., employed with reduction in number of stools and no effect on the pulse rate.

Progress was satisfactory until September 14, when patient had a chill and the fever rose to 101.4 with a pulse of 120, and a similar phase on September 17. Liver abscess was suspected at this time.

Emetine was used from September 5 to 15. The febrile disturbance continued five days till September 23, the pulse showing irregularity. Emetine was employed from September 27 to October 3, in ½-grain doses once daily.

October 3: pulse rapid, motor weakness and nervousness. Blood pressure 108-64-44.

October 4: chill followed by fever of 103. Pulse irregular and rapid, the rate being 162. Respiration 42.

There was marked dysphagia and patient had difficulty in swallowing for three days. Took very little nourishment, desiring not to attempt to swallow, fearing strangulation. Patient weak and asthenic. Bases of both lungs showed evidence of congestion and there was cough with expectoration—the cough being shallow and abortive.

October 5, 1916: patient brighter. Foul diphtheric odor to the breath, and the throat displays a pustular exudate on the posterior wall. Culture made at this time showed an organism resembling morphologically pseudo—diphtheria bacilli. The tongue was red, beefy, dry and fissured. Patient too weak to permit a comprehensive examination of the lungs. The respiration was 42, the pulse rapid, thready and irregular. The temperature, 101.6. Died October 5, 1916, at 10.00 a. m.

Clinical picture: Patient was having almost constant diarrhea and was so asthenic early in his illness that he had no control over the rectum. Later he improved and was progressing satisfactorily until the chills on September 14 and 17, with subsequent febrile manifestation. The stool examinations showed for ameba: August 9, 1916, positive; August 28, negative; September 4, and September 11, positive; September 13, negative; September 15, positive; September 25, and September 30,

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negative. *Treatment.* Emetine exhibited as follows: August 10 to 19, 9 grains; August 21 to 24, 3 grains; September 5 to 15, 10 grains; September 27 to October 3, 3 grains; a total of 25 grains. Motor weakness manifested by falling forward of the head, and difficulty in swallowing. When asked to take nourishment, replied he would rather not, as he would choke. Pulse showed marked irregularity and during last two days extreme acceleration of the rate. Accelerated respirations with evidence of congestion at the bases of both lungs. Clinical Diagnosis: Dysentery entamebic, acute. Complication, October 3, 1916 (added diagnosis), pneumonia, lobar, acute, lower lobe left lung.

Autopsy Notes.—Died October 5, 1916. 10.00 a. m. Autopsy 1 hour later. Inspection of body revealed nothing pertinent to cause of death. Body poorly nourished, poorly muscled. No wounds, bruises or disclorations. Thorax. Sternum negative. Pericardium, heart, valves, and large vessels negative. Lungs: Few trivial adhesions of both lungs at bases. Lower lobe of left lung sinks on placing it in water. Bleeds freely on section. Pus is discharged from all cut bronchi and bronchioles. This pus, later examined, exhibits no ameba, but a few unknown diplococci. Entire lower lobe congested. Condition resembles state of pneumonic red hepatization. Right lung in lower two lobes presents same condition. Upper lobes of both lungs mildly congested with few small areas of solidification. Cultures of throat made post-mortem, exhibit organism having characteristics of diphtheria. (? ? diphtheroids). Scant abdominal panniculus. No distention, or free fluid in abdomen. Omentum negative. Stomach small, no larger than thick large banana; negative. Intestinal tract presents no ulcers, no inflamatory processes. Colon opened and contents examined for ameba; none demonstrated. Colonic mucosa normal. Scant contents in any portion of intestines. Spleen normal, pancreas normal, liver normal, kidneys normal.

Autopsy Summary: (1) Pneumonia, lobar atypical, acute; involving lower lobes of both lungs. (2) Septic bronchitis.

Case No. 2.—Age 38 years. In U. S. Army, 13 years and 7 months. Diagnosis: Dysentery entamebic chronic (recurrent). Family history has no bearing. Had the usual diseases of childhood. No other illness until 1906, while in the Philippine Islands, where he contracted dysentery, and, from questions, the type clinically resembled amebiasis. He had another attack in 1910 while in the Philippine Islands and again while in Mexico shortly after entering that country. He did not go on sick report, as he was accustomed to have outbreaks of diarrhea after his original infection in 1906, and stated that he could forecast an attack

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by a certain heavy sensation in the abdomen, or an occasional griping pain. Patient has observed mucus in his stools constantly since the first attack, and his bowels would move from 2 to 4 times a day during periods when he felt well. His history while in Mexico showed periods of diarrhea alternating with periods when he felt fairly well. During his service his time has been spent as follows: 1901–04, Newport, R. I.; 1905–7, Philippines; 1908–10, Fort Sam Houston, Tex.; 1910–13, Philippines; 1913–16, United States.

April, 1916, entered Mexico and had diarrheal attack in May, which persisted in a more or less acute state until he was admitted to the hospital at Colonia Dublan, about September 1, 1916, whence he was transferred to Base Hospital, No. 2, Fort Bliss, Tex., on September 5, 1916, with a diagnosis of lumbosacral subluxation and chronic entamebic dysentery; both being concurred in at this station, but the dysentery was predominant, as shown by repeated stool examinations.

Patient progressed favorably from date of admission until October 12, 1916, when he complained of exhaustion and weakness, exhibiting extreme motor weakness, characterized by inability to hold the head upright for more than a few seconds, and difficulty in swallowing. There was inability to raise his hands to his mouth, and every voluntary effort calls forth a marked, coarse, muscular tremor. A culture from the throat showed the presence of streptococci.

October 17, there was evidence of congestion of the middle and lower lobes of the lung on the right side with marked air hunger and dyspnea. About noon on this day the patient exhibited signs of extreme cardiac distress, manifested by rapidity—rate 196, by stethoscope—and loss of radial pulse.

Patient had a similar attack the previous day, October 16, but much less pronounced. On October 17, the temperature was 96° F. in the morning and rose to 101° F. by noon, with rapid pulse, 130, and respirations of 36 to 40. On October 18, the patient could swallow better, but still had extreme weakness with dyspnea and rapid pulse, and the heart sounds were muffled and irregular. He complained of greater frequency of the sinking spells. The temperature this date was 98.4 F. (axilla), respirations 30, and pulse 128 to 140. He died at 1.45 p. m.

Clinical picture: Motor weakness—ability to start a voluntary muscular effort with failure to complete it, due to apparent lack of muscular power. Swallowing—able to accomplish the voluntary phase of the act of deglutition, with inability to complete the act—food regurgitating and producing strangulation. Respirations. Air hunger, with rapid respirations, but the auxillary muscles of respiration were not brought into play with the vigor seen in cases of pneumonia. The

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desire for air was prominent, but the muscular effort necessary to inflate the lungs was absent. Heart: there was no antemortem evidence of dilation or hypertrophy, as shown by physical examination. The heart was rapid and irregular and there was non-response to stimulating drugs.

Treatment: First Course.—Emetine hydrochloride in ½ grain doses twice daily for twelve and a half days = 12½ grains. Second Course.—Emetine hydrochloride in ½ grain doses daily for fourteen days = 7 grains; which was increased ½ grain daily, result of a positive amebic stool, for four days making 11 grains or a total of 23½ grains in two courses, with an interval between courses of five days.

On October 9, emetine was stopped on account of nervousness which had been a symptom in the previous case, and vigorous stimulating measures instituted. Patient's nervousness and weakness were particularly obvious for six days prior to his death which occurred October 18, 1916. Clinical Diagnosis: (1) Acute dilatation of heart; (2) Dysentery, entamebic, chronic.

Autopsy Notes.—Died 1.45 p. m. Autopsy, 3 p. m.

Essential findings.—On inspection of body, no wounds or markings bearing relation to death. Body well nourished. Abundance of muscle. Muscle flaccid. Much tatooing on arms and shoulders. Chest opened. Costal cartilages partially ossified requiring sawing. Sternum negative. No thymus. Heart enlarged. On sectioning pericardium, no increase of pericardial fluid. Heart in diastole. Distention of auricles. Engorgement of right ventricle. Fat is in excess over entire right heart, especially in region of vessels. Heart removed and opened. The right ventricle is extremely flaccid. Resembles the quivering seen in gelatine. The fat was of golden color. Fat about 6 to 14 mm., thick replacing myocardium which is exceedingly thin, in some places as thin as 1 mm., and averaging about 2 or 3 mm. The valves are negative. The left side of heart (ventricle) is thickened averaging about 2½ cm. No excess of fat on this side except in area of coronaries. Valves negative. Left lung removed. No adhesions. Lung small and apparently partially collapsed. The lung *in toto* floats. The lower lobe is solid resembling postmortem hypostasis; this condition, however, does not exist. Upper lobe presents isolated areas similar to lower lobe, but far the larger portion is crepitant. On section the upper lobe uniformly congested. The degree of congestion is trivial, not a true hepitization, not a post-mortem change. The blood present is of bright red color. The lower lobe on section presents pus in all bronchi. Specimens taken from this pus exhibit no ameba. Entire lower lobe congested—atypical pneumonia. Portions cut away from less involved areas quickly sink. No abscesses,

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no tubercles. Right lung very similarly involved. More pus found in bronchi and bronchioles than on left side. Gross congestion of two lower lobes.

No gaseous distention of the abdomen. On section, 4 cm. of panniculus. Well developed abdominal muscles. Peritoneum negative. Much fat in omentum. Stomach distended. Hour-glass stomach with false pylorus. Alimentary tract inspected from cardium to rectum—*normal throughout.* In entire colon firm scybalous fecal masses. Appendix normal. Gall bladder negative. Spleen small and closely adherent to stomach. Otherwise negative. Pancreas has fat in small amounts beneath capsule. Negative. Liver normal size. On anterior surface of left lobe small area, size of dime, which bulges, is dark colored, and soft to touch. On section through this area a spherical mass, 1 inch in diameter is demonstrated. No pus is present, not an amebic abscess. This area retains the hepatic stromal tissue, with apparently, blood-stained necrotic parenchymatous tissue. No other similar areas demonstrated. Kidneys negative. Suprarenal bodies removed and sectioned; normal in size and color. Very soft. Medulla necrosed and discolored.

Autopsy Summary: (1) Dilatation of heart (right); (2) Pneumonia, atypical lobar; (3) Fatty degeneration of heart (right); (4) Septic bronchitis.

It will be noted that Cases Nos. 1 and 2 showed, at first, a general motor weakness affecting particularly the muscles of the back of the neck, with a tendency for the head to fall forward, later a difficulty in swallowing, and finally a pneumonia of lobar type. One case showed decided cardiac signs, possibly attributable to failure of vagus control. These cases were treated with emetine, particularly during the acute stage of the disease, and received in all 23½ and 25 grains each.

Case No. 3.—Diagnosis: Dysentery, entamebic acute. Treatment: Emetine hydrochloride hypodermically ½ grain twice daily for a period of ten days. The stools remained positive for ameba, and treatment with emetine was continued—the dose however, being reduced to ½ grain in one dose daily. This dosage was maintained for a further period of sixteen days, giving, in all, twenty-six days uninterrupted treatment with emetine, with the exhibition of a total of 18 grains of the drug.

On the twenty-second day there was observed, by the patient, a feeling of weakness, exhaustion and general nervousness. The nervousness was manifested by a general coarse muscular tremor, most pronounced in the hands, and especially when attempting voluntary effort, and resembled the tremor seen in paralysis agitans. On the twenty-fourth day the patient complained of weakness in the muscles

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of the neck, and two days later these muscles were unable to sustain the head in the erect position for more than a few minutes. Irritative diarrhea was present in this patient and was evident for several days prior to discontinuing treatment with emetine. The patient in describing his condition stated that he felt tired all over, and lacked the energy necessary to accomplish any physical effort. Emetine was discontinued on the twenty-sixth day, and the patient showed improvement in every way, which was noticable three days after the drug was stopped. At the end of two weeks the patient was able to return to duty.

Points of special interest in this case are: motor weakness, irritative diarrhea, and moderate circulatory disturbance, *i. e.*, slight acceleration and variation in the pulse rate. The quantity of emetine, 18 grains, was not excessive, but it was given for too long a period, and indicates that a long uninterrupted course, even when the dosage is small, has toxic or deleterious effects.

Case No. 4.—Diagnosis: Dysentery, Entamebic, Acute. Treatment: Emetine was administered continuously in this case for thirty-four days, receiving a total of 29 grains, the dose varying from ½ to 1 grain daily. This patient was admitted to Base Hospital No. 2, Fort Bliss, Tex., on September 1, 1916, with an immediate previous history of recurrent attacks of diarrhea while with the Punitive Expedition in Mexico, having been in Field Hospital No. 7, from July 18 to July 30, and in the Cantonement Hospital, Columbus, N. Mex., from August 1 to September 1. At the latter place a diagnosis of entamebic dysentery was made. Further data gained give a prior history of an operation for hemorrhoids in May, 1916, and periods of weakness and exhaustion associated with pains around the heart, cold perspiration and trembling dating from June 1, which was prior to the onset of dysentery. These periods of weakness and exhaustion have occurred frequently since admission and are attended with nausea and vertigo, arising without cause, lasting about fifteen minutes and followed by accelerated heart action.

On the twenty-sixth day of emetine treatment the patient passed through a phase of motor depression associated with extreme exhaustion, muscular weakness, rapid pulse, slight dyspnea and diarrhea. In view of the patient's previous history, this phase was not associated with the treatment, and this interpretation was supported by the patient's statement that since the onset of dysentery his periods of exhaustion have not increased in severity of frequency, and emetine was used for eight days more in reduced doses. After the specific treatment was discontinued there was a decrease in the diarrhea, improvement in

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the rate and volume of the pulse, and general improvement in physical strength, indicating that emetine was producing cumulative or toxic action in this case.

Case No. 5.—Diagnosis: Dysentery, Entamebic, Acute. Treatment: Emetine was used in this case for a period of twenty-eight days and 25⅔ grains of the drug were given, being practically 1 grain daily. On the twenty-third day of treatment the patient complained of muscular weakness and the pulse rate increased, varying from 104 to 140. These symptoms continued for five days and were uninfluenced by stimulation. On the twenty-eight day of emetine treatment the patient complained of abdominal pains and diarrhea. The pulse at this time was rapid and there were marked variations in the rate, and the heart sounds were indistinct. The patient exhibited signs of extreme physical exhaustion, described a lack of power or energy to perform muscular effort. There was a general motor weakness particularly noticeable in the muscles of the neck, arms and legs. There was a tendency for the head to fall forward and voluntary motions of the hands were attended by a coarse muscular tremor. Deglutition was not disturbed. Respirations were not interfered with, although the expirations were slightly prolonged. The circulatory depression and motor weakness so evident in this case could not be ascribed to dysentery and are regarded as toxic manifestations of emetine.

Case No. 6.—Diagnosis: Dysentery, Entamebic, Acute. Treatment: Emetine was given in one course for twenty-two days being 1 grain daily, and totaled 22 grains.

When admitted to the hospital, the patient complained of weakness and soreness in the muscles of his forearms and legs. Two weeks after admission, having had 14 grains of emetine, the patient stated he felt very weak and had severe pain in his forearms and legs. The pain at this time followed the nerve trunks and could be elicited in the peripheral nerves and clinically was due to neuritis. There was also a greater degree of muscular weakness than could be attributed to his neuritis, and the pulse was accelerated and showed marked variations in the rate. These symptoms persisted in spite of measures to alleviate them, and emetine was continued on the twenty-second day.

The neuritis cleared up in five or six days, but the motor weakness continued, and therefore must in part at least, have been due to the toxic effect of emetine.

Case No. 7.—Diagnosis: Dysentery, Entamebic, Chronic. Treatment: While in Mexico patient received 23 grains of emetine and after admission to Base Hospital, No. 2, Fort Bliss, Tex., a second

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course of 22 grains was administered, making a total of 45 grains. During the course of his illness the patient complained of being weak and nervous and stated that he lacked the physical strength necessary for muscular effort. The motor weakness in this case was general, but was more noticeable in the lower extremities. There was a general coarse muscular tremor, malaise, and a sensation of falling, due to the failure of the locomotor muscles to sustain the body weight, not associated with vertigo. The diarrhea was severe and the pulse slightly accelerated. Four days after emetine was discontinued in this case the diarrhea subsided and motor weakness was less felt. This patient received a larger total amount of emetine than the other patients, yet showed less toxic effect in proportion to the quantity used, which indicates either tolerance for the drug in this instance or idiosyncrasy in the previous patients.

The two deaths reported here cannot in any degree of probability be assigned to the effects of entamebic dysentery, as clinically both cases were progressing satisfactorily through the chronic stage of their attack, and post-mortem evidence of an amebic death was entirely lacking. In view of the fact that emetine poisoning is manifested by such signs and symptoms as were shown in these cases, it seems fair to assume at least, that the emetine used played more than a minor part in the causation of these unusual conditions in entamebic dysentery. The question of peculiar susceptibility of nerve and muscle tissue should be considered, as we know that many cases do not show these untoward effects.

The present method of administering emetine in cases of entamebic dysentery at this hospital is as follows: 1/3 grain daily, increasing 1/3 grain per day until 1 grain is given, continued until 8 grains have been given. With the emetine, bismuth subnitras in large doses, is given. For the succeeding period of ten days colonic irrigations of 1–1000 quinine solution are given once or twice daily. If the stool is still positive a subsequent course of emetine, 1 grain daily, is given for three days. By this method of treatment the patient receives 11 grains, which is less than the single lethal dose stated by Sir Leonard Rodgers. This procedure usually suffices to free the stool from ameba and cysts. There are occasional cases which will require a third course, which is not instituted until after a sufficient lapse of time and not then, if asthenia or special contraindications exist, *i. e.*, motor weakness, irregular heart action, nervous exhaustion or irritative diarrhea. In view of the experiences here cited we deem it wise to advise a very careful and watchful course in the use of emetine, in protracted cases especially.

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Animal experiments have been conducted by Dr. Carey Pratt McCord of this hospital, to reproduce in animals some or all of the lesions we have observed in the human. The series of animals so employed is far too small to permit any except guarded deductions. (1) Rabbits injected with single massive doses (22 and 44 mg.) of emetine intravenously die within two minutes. In these, the significant manifestations are a very rapid and forceful heart beat, passing over into fibrillations. General muscular twitchings. No pertinent findings at autopsy. (2) Rabbits subcutaneously injected with emetine in amounts varying from 11 to 44 mg. have all died. Upon the administration of 44 mg., death occurred after sixty to seventy-five minutes. The condition prior to death was similar to that described in (1) above. Those rabbits receiving smaller doses lived from three to ten days. All exhibited profound asthenia, rhinorrhea, watery diarrhea. At autopsy two sets of manifestations are noteworthy. (1) In four rabbits the lungs exhibited a congestion and hepatization identical to that described in the autopsies on Cases 1 and 2. In these, the auricles were engorged and veins congested. The hepatization in one case was unilateral and in two others was present in the lower lobes of both lungs. (2) Three animals presented alimentary abnormalities that may stand in relation to emetine action. Prior to death these exhibited a watery diarrhea. At autopsy one was found to have large bright red ecchymoses in the intestinal wall of the large intestine. In two others, a distinct inflammatory process involved the entire small intestine. The intestinal wall was edematous and the intestinal contents were gelatinous. (3) The dose of emetine as employed in this hospital for amebiasis was computed per kilo. A proportional amount was administered per kilo to rabbits. Four such rabbits were daily injected intramuscularly; all four died, respectively, on the fourth, seventh, eleventh, and twelfth day. All exhibited asthenia prior to death. At autopsy two exhibited no demonstrable lesions. The other two had the condition described in (2) above. (4) Dogs similarly treated with emetine are influenced in the same way. Whether the emetine be administered in one mass dose or in small daily doses, the animals are found to have a bloody diarrhea, nausea, apathy, rhinorrhea, and paroxysms of coughing. At autopsy these animals have highly inflamed stomach and intestines. The lungs are hemorrhagic with many air spaces occluded by extravisated blood. The single inference allowable from these experiments is that emetine, when administered to animals in doses equivalent to those given to humans and in larger amounts, is attended by a definite toxicity.

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EDITORIAL

THE SOUL OF AN ARMY

A man, arms and a uniform, according to the prevalent American idea, make a soldier. They do—but not by any means a fighting soldier. Our materialistic standards merely create a combination capable of fighting—if it will; but the question of willingness to fight dominates the combination. As the brain is master of the body, so fierce determination can often force the feebler physique to snatch victory from defeat. Conversely, the individual or organization which admits itself inferior is already beaten, even though it may be superior to the adversary in every physical and materialistic sense. Guns and equipment win no victories—it is the men who use them. Thermopylae and Marathon long ago showed the military triumph of mind over matter. The mental exaltation to do or die doubles and triples the fighting efficiency of a command. Yet with us this driving force seems strangely forgotten.

The state of mind which wins victories is a mental complex in which patriotism, utter self-sacrifice, mutual interdependence, subordination, courage, instinctive reaction against stress, pride of organization and other factors play their part. This proper state of mind must be created before the individual man becomes part of the fighting machine. The military organization is merely a group of units which must be developed into the same combatant state of mind. Few individuals naturally possess the proper mental attributes—none in like degree. All must mentally be molded into acceptance of a general type of military ideal, thought and determination.

Against this mental standardization American individualism rebels. Yet the military value of our prized individual initiative may very well be overrated and even interfere with military efficiency. Modern war is not the struggle of savage against individual savage; it is not the leading of one loose military group against another; it is the struggle of organized millions against other millions similarly organized. Only team work counts and individual effort is practically wasted.

Here is where our boasted American individualism fails. Much as we may be loath to admit it, it is perhaps inferior for modern military purposes to the coördinating thought which may be impressed on a less intelligent but more docile European peasantry. It is adapted only to small organizations, loosely handled, when individuals may need to make quick decision for themselves. Our politicians are fond of de-

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claiming that, man for man, our Army is equal to any in the world. This is not only true but probably is an understatement. Also it is highly misleading. Man for man, our Army is doubtless superior to any in the world. But the same comparison does not necessarily follow when applied to regiments and brigades. It certainly does not follow when applied to divisions and the higher organizations, where man is not pitted against man but one complex military machine against another. The problem shifts from one of individual initiation and efficiency to one of combination and coöperation by great masses. And the whole trend of American ideals, training, government and legislation, is toward a competitive individualism which does not readily subordinate itself to that community of purpose and method which is necessary to transform individuals, in the military uniform, into a fighting machine, working with the minimum of friction. What an army needs is coöperative and not individualistic efficiency.

Outside its own personnel, the Medical Department plays no direct part in creating the fighting spirit. Indirectly, it has a far-reaching influence, through its direct relation to health conditions and resulting state of bodily vigor. A sick army is a dispirited as well as weakened army and lacks the mental stimulus as well as the physical stamina necessary to successful campaign. So, too, the care which it is prepared to give the disabled has a close relation to fighting capacity. Men fight far better and endure more if they feel that behind them stands a medical service prepared to give them prompt and efficient succor if wounded. They fight better, also, if the medical service promptly removes the wounded—and the depressing psychological impression which such create—from their environment.

In such ways, the Medical Department does much to maintain the "fighting edge."

The chaplains could assist greatly in creating a spirit of healthy patriotism and conviction as to the justness of military purpose. Religious incentive is perhaps the most powerful stimulus to belief in victory and to determination to achieve it. All nations engaged in the present war have utilized this faith to the greatest extent. Mohammedans believe themselves the direct agents of the Deity, and gladly die fighting unbelievers, in the security of a promise of special reward in the hereafter. Cromwell's Roundheads, before going into battle, were exhorted by the Puritan ministers to "smite the Amalekites," and prevailed over the otherwise better forces which lacked such stern psychologic stimulus. Our present chaplains, however, are some of them avowed pacificists and against the use of force even when some great moral issue is involved. Such exert no influence to make men

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willing to fight—and if need be to die—for some lofty principle or cause. There are too few exhortations and sermons on duty, patriotism, and the obligations of the citizen and the soldier to his country.

Most officers of the line do not take up the cultivation of the so-called military spirit and "fighting edge" either intelligently, comprehensively or systematically. Military discipline and drills tend to produce, among other results, a mental state of mutual reliance, belief in invincibility and steadfastness in adversity. But this in a way is merely a by-product of the effort to create organizations mechanically capable of military evolutions and of bearing arms. There is no intelligent and concerted effort to cultivate other than the outward attributes of the soldier. The unseen driving force necessary to convert these outward attributes into military results is overlooked or disregarded.

Pride of organization is a powerful factor in determining psychologic standards. The history of past achievements stimulates to present endeavor. The victories of such old existing regiments as the "Black Watch" fill their soldiers of today with an emulation and determination which will cost the enemy dear and may save battles. Abroad, the regimental *esprit* is carefully nourished. In this country we ignore it. In our regular service officers and men are detailed from regiment to regiment without the slightest reference to regimental ties and sympathy. A regiment no longer is a military home and the channel of a military career—it merely furnishes a temporary military job. The great regimental deeds of our past no longer impress the short service soldier or grip the migrant officer class. As for the militia, most without war service and recruited for peace routine, organizations lack the military stimulus of both possession of a brilliant past and anticipation of an illustrious future.

Along the border we have been dealing with troops materially well equipped but deficient in high ideal. It has been an army without a soul. The first thought of the great majority of its human units has been one of self interest and self comfort. Marching, for example, is done not only with the feet but with will power. In too many instances men have fallen out from lack of will power when physically perfectly able to continue in the columns—and the complaints and example of these "quitters" have done much to lower the psychic force of those of stronger will.

So, too, would it be in battle. The man with not enough pride to stick out a march for the credit of his company, the honor of his regiment and the efficiency of his division will never fight under conditions of adversity.

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We repeat that in our Army the matter of its psychic military stimuli has been neglected. It behooves the authorities to give it proper consideration. There must be systematized education and training in the psychology of the soldier and of war. This field is now not covered. It is a "no-man's land" into which neither line nor staff penetrate. Psychology is really mental hygiene. Why should not the Medical Department charge itself with the development and maintenance of sound military mentality as well as with the good physique and bodily vigor of soldiers?

Our Army sorely needs to find its soul.

E. L. M.

PREPARING THE MEDICAL PROFESSION OF THE COUNTRY FOR WAR

No one who has given the slightest intelligent thought to the subject can fail to appreciate the very important rôle played by the sanitary department in modern wars. To be sure, as Sir Alfred Keogh, Director General, R. A. M. C. says, "It has never heretofore been the predominate partner in war work;" yet one has but to read his wonderful paper on "Surgical Organization in War,"[1] to realize how large a factor it has become. This rôle demands not alone the preparation of a certain body of trained medico-military experts as a permanent part of an army, absolutely essential as such is, but of the whole profession of the country. The nation in arms will necessarily require the services of its entire medical personnel.

THE MILITARY SURGEON has for a quarter of a century striven to bring this fact to the attention of our profession, but only now is the cult beginning to realize how important a factor it is in war, and how necessary it is that the individual physician should be reasonably informed of what is expected of him, in the event of hostilities.

Dr. Franklin H. Martin, representing the Council of National Defense, and Dr. F. F. Simpson, the Advisory Committee of Civilian Physicians and Surgeons on Medical Preparedness, are very actively engaged in a plan to induce the medical schools of the country to introduce courses in Military Sanitation and, the students to participate in them. Nothing could be better as a beginning. If a general knowledge of military sanitation is to be disseminated throughout the profession, the medical schools necessarily will be the largest factor in its accomplishment.

The medical student, however, is not easily fooled. If he is asked

[1] See THE MILITARY SURGEON for November, 1916.

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to shoulder additional scholastic burdens, he must be given reasonable assurance that the added weight is worth carrying and the reward worth striving for. No one questions for a moment the concrete patriotism of the medical man, his very existence is one of self-abnegation and devotion to the public welfare. Nevertheless, he is entitled to consideration and, in this particular instance, the consideration should be that the course in military sanitation is made worth while, that it will really teach what it professes to and that the participants in the course must prove that it teaches, by passing an examination in the subject. Moreover, the outcome of the examination should cut some figure in class standing and weigh in ultimate appointment to the Officers' Reserve Corps. If this is not done, the result will not be commensurate with the effort, the time of the teacher and student will be wasted and the country lulled into an unjustifiable belief that the profession is "prepared." THE MILITARY SURGEON holds that we should go even further than the school examination and require every candidate for State license to pass in military sanitation. Indeed, as a general proposition, no public examination of any kind should be without some phase of military preparation.

To organize such a course of instruction is not an easy matter, though it is no new thing in the older countries. In a way it has to be lived to reach its best results. The students should pass through the different grades of the Medical Department, in the succeeding years of their course, progressing from private soldier, to noncommissioned officer and finally officer. In the British Medical Schools, as stated in another article, sanitary companies were organized and maintained their existence through succeeding generations of students. These companies were officered by the professors of the various schools; they were an integral part of the available military force and, no doubt, were valuable schools of instruction. Their membership was voluntary, so the knowledge they gave was not as widely disseminated as it might have been.

Teachers, like poets, are born not made, and the success of any course largely rests with the teacher. Nevertheless, whether well or ill taught, if the course is well organized, something worth while can be gleaned from it. Such cannot be expected to make finished medical officers, they are products of many forces, any more than can six months' experience in a hospital, make a trained nurse—still, it helps.

The subjects of the course may be outlined as follows: A brief resumé of the history of military surgery; a glance at the history of the Medical Department, United States Army; an outline of modern military sanitary organization illustrated by examples of the present

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war; the medical officer; the personnel of the Medical Department, United States Army; Army laws and regulations; articles of war, customs of the service, military discipline, courts martial, correspondence, etc.; the manual and drill regulations of the Medical Department; the sanitary inspector and his inspections; the administrative care of the sick; difference between civil and military practice; surgeons call; reports, records, etc.; management and control of hospitals; the physical examination of officers and men; method of conducting the examination; the recruitment of the Army; the discharge of the physically unfit; the officers of the Medical Corps, appointment, training and career; the enlisted soldier of the Medical Department, his recruitment, instruction and control; the Nurses Corps; medical supplies; field organization of foreign armies, of our own Army; operations of the Medical Department in war; front, lines of communication and base; field problems; Geneva Convention; the Red Cross, etc., etc. And this instruction, so far as applicable to dental and veterinary officers, should be given in their schools.

Such a course as this, interspersed with practical exercises in inspections, physical examination of recruits, making out of official papers, records, etc., first aid, bearer drill, solving of problems, *id genus omnes*, could be made sufficiently interesting and valuable to attract the attention and hold the interest of the medical student. THE MILITARY SURGEON, however, questions if the busy student will give the requisite time to any subject, no matter how important to the public welfare, unless it be made a part in the regular curriculum of his school and given a definite value in the requirements for graduation.

THE NAVY'S HOSPITAL SHIP

In accordance with the provision of the Naval Appropriation Bill approved August 29, 1916, the Navy will have a hospital ship. Congress appropriated $2,350,000 for this purpose and specified that the work should be begun as soon as practicable. Preparations are now under way to build this ship at the Navy Yard, Philadelphia, Pa. It will be the first ever built solely for hospital purposes and represents a new field in naval architecture. The Bureau of Medicine and Surgery, Navy Department, has long advocated a ship of this class and its recommendations have been endorsed by the General Board. The usefulness of hospital ships has been amply proven by the present war in Europe, and their necessity in our Navy was the subject of an editorial in the May number of this journal as well as on other occasions. Surg. Gen. Braisted, of the Navy, is a strong believer in the value of a hospital ship as a constituent part of our fleet, and his report on the Japanese naval medical and sanitary features of the Russo-Japanese

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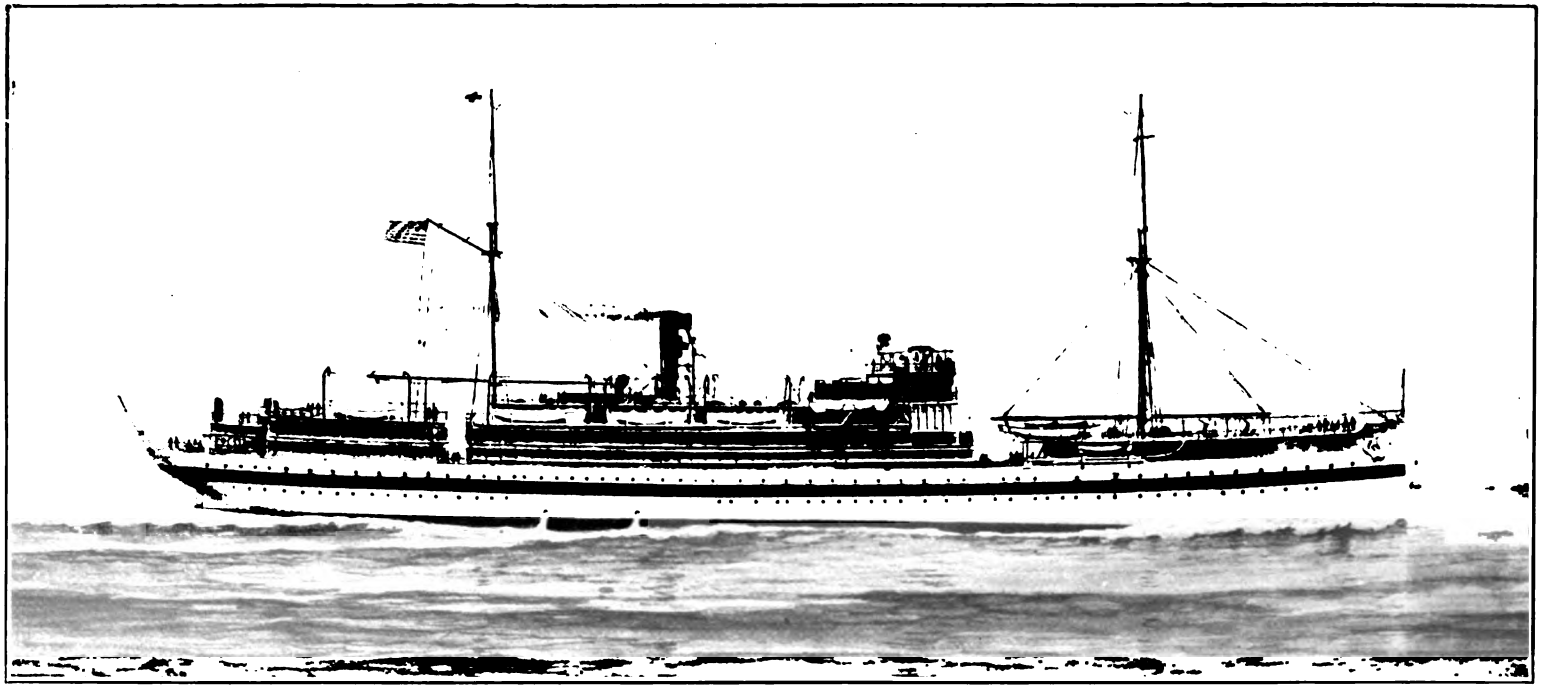

THE NAVY'S HOSPITAL SHIP.

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War, bears tribute to the interest he has always felt in this subject. The new ship not only will include all of the features of our largest and best equipped naval hospitals, but also provisions for an out-patient department, where persons may receive special examinations or treatment, not to be obtained aboard the ordinary ships of the fleet, and which will greatly enhance her value.

She will be an oil-burner and free from all the dust and dirt which result from coal consumption and the discomforts connected with taking coal aboard, which the ordinary traveler of the sea does not experience. In order to make the ship as steady as possible she will be fitted with stabilizers, a gyroscopic contrivance designed to reduce the roll and pitch to a minimum. The hospital departments will be of a most complete character, and every effort is being made to include in the design, the best modern and up-to-date systems of lighting, heating and ventilation. Her main operating room will be a large space extending the height of two decks and provided with ample natural illumination. Her out-patient department will contain dental operating room and dental laboratory, X-ray and X-ray study rooms, eye, ear, throat and nose rooms, with adjacent small operating rooms and treatment booths, and a most complete chemical and biological laboratory equipment. In addition to her wards with quiet rooms adjacent thereto, and other accessory rooms, such as linen rooms, toilets, wash-rooms, pantries, etc., she will have small operating rooms, dressing rooms, a hydrotherapeutic department, a thermo-therapeutic department, endoscopic room, and a special acute-treatment room, in connection with the venereal ward. The contagious disease department is so designed as to be effectively separated from the rest of the activities of the ship, and to have the latest features of disinfection and control-communication. There is every indication that the ship, when completed, will represent the most modern ideas of hospital arrangement and construction, so far as such may be adapted to a ship, and meet the structural requirements and the necessity of compartment division below the water line. The Surgeon General and Medical Corps of the Navy are to be congratulated upon the fruition of their efforts to obtain this addition to the efficiency of the fleet, so long hoped for by naval medical officers.

THE FELLOWSHIP OF THE AMERICAN COLLEGE OF SURGEONS

Largely through the efforts of former Surg. Gen. Stokes, U. S. Navy, The American College of Surgeons at its recent convocation, took up the question of conferring the Fellowship of the College upon the medical officers of the Army, Navy and Public Health Service without the payment of the Fellowship fee. It was pointed out to the College

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that the military surgeon is in a much different position than is his confrère in civil practice who may aspire to become a fellow of the College. The fee itself, $200, is a deterrent and likely to exclude from fellowship many of these officers, and the College should throw down, rather than insist upon the maintenance of this barrier against the men into whose keeping is placed so large a portion of the nation's surgery. Since so many of the members of the College are officers of the Reserve Corps it would seem as though their colleagues on the active list should also be Fellows. Apparently this view prevailed and a committee from the Board of Regents reported favorably on the abolition of fellowship fees for officers of the Army, Navy and Public Health Service who are otherwise qualified. This included both the United States and Canada. Thus another bond between the military and the civilian surgeon has been forged—a bond which will go a long ways toward medico-military preparedness.

THE NATIONAL BOARD OF MEDICAL EXAMINERS

The lamented Rodman, physician, patriot and promoter of the best interests of our profession, with broad vision saw the great value of a national licensing board, not only to medical education, and the individual physician, but to the Republic, in that it would cement a bond of union between medical men throughout the whole nation, like unto nothing else, thus unifying and dignifying the profession. But even beyond this, Rodman saw the strong influence such an organization must ultimately have in furthering "preparedness" among us for national defense. It is this last, as well, which gives THE MILITARY SURGEON such an abiding interest in The National Board of Medical Examiners.

A report of its first examination and the results thereof, has recently been published; an auspicious beginning. Of the thirty-two candidates for the licentiate, it is interesting to note that only half possessed the essential preliminary and medical qualifications; of these ten appeared for examination; five were successful.

The Mayo Foundation very promptly offered a fellowship to the five successful candidates. Of course, as the number of candidates increases, it is hardly to be expected that the necessarily limited number of fellowships will be sufficient to meet the number of licentiates each year, nevertheless the appreciation of the Mayo Foundation for the certificates of the National Board of Medical Examiners is significant.

Of especial interest to us is the fact that one of the successful candidates was appointed to the Medical Reserve Corps of the Army, with

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a view to being commissioned in the Regular Corps, and he will be admitted to the Army Medical School in October without further mental examination. This is evidence of the esteem in which the certificate of the board is held by the Army Medical Department. Moreover, we are told that the Medical Department of the Navy also is ready to accept licentiates into its Reserve Corps and school as well, without further mental examination.

Already a number of the State Examining Boards have announced that they will recognize the certificates of the National Board, and the Federation of State Examining Boards adopted resolutions at its last annual meeting approving the aims and purposes of the national body. What this means becomes more apparent when it is realized that the Federation is composed of the Boards from twenty-eight States. There is every promise that the large majority of the States will recognize the certificate of licentiates, for practice, at an early date. This done, the nationalizing of the profession will be well on toward completion, and medical officers who possess this qualification will be free to practice anywhere in the United States.

The membership of the National Board as now constituted comprises six each from the Public Medical Services and the profession at large, and three from the Federation of State Medical Boards. We are informed that it is proposed to enlarge the membership to eighteen, the three additional members to come from the Federation, thus giving each class equal representation. Report has it that the proposed increase in membership is to be discussed at the next meeting of the Congress on Medical Education, Medical Licensure and Public Health, to be held in Chicago, February 5 and 6, 1917.

Undoubtedly something remains to be done before the National Examining Board is wholly perfected, but every examination must promote its efficiency as well as reputation and, no doubt, it will soon become a real national asset.

THE MEDICAL CORPS OF THE NATIONAL GUARD

It is a significant fact that among the many criticisms and complaints that have appeared in the press from members of the Guard during their stay on the border, and since their return, none has come from the Medical Department. In this respect it has presented a marked contrast to the line. The 800 odd medical officers have performed cheerfully their duties and made no kick. Efficiency reports show that they have done good work and, with few exceptions, applied themselves diligently to learning the details of their department, though the paper-work especially was unfamiliar to most of them.

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In a recent number of *Collier's*, Rupert Hughes refers to the sacrifices made by prominent physicians in leaving their practice for several months, to perform the routine duties of regimental surgeons, knowing that their less patriotic confrères at home would naturally take advantage of their absence to increase their own practice. This is undoubtedly true in the cities, in which competition is keen and patients less loyal than in the small towns and county districts, which furnish the minority of the medical officers of the Guard.

We do not wish to brag too much about our own profession, but we are justly proud of our brothers who have recently returned from the border, to pick up their scattered patients, uttering no word of complaint, but bearing themselves with soldierly restraint and dignity. They do not ask, or expect, public approval, but it affords them no little satisfaction to feel that criticisms of their work have been few, and that they have the approval of their superiors and their own consciences.

We take this opportunity of testifying to their soldierly qualities, their hard work, at high pressure, incident to the hurried examination of troops during the first feverish days of mobilization, their devoted attention to the sanitary care of their commands en route and after arrival in camp, and their faithful service during the tedious weeks of waiting—these will not be forgotten. Whatever may be the future of the Guard, we are sure that its Medical Corps will always be ready to serve the State, *and* the United States, when and where they may be needed.

We suggest that the medical section of the Officers' Reserve Corps would be distinctly strengthened, by the addition to its membership of many of these meritorious officers, who have enjoyed the advantages of such valuable training.

The National Guard may be open to criticism, but *not* its Medical Corps.

Incidentally it should be noted, that the corps is a unit in favor of universal military training, since it too objects to being "penalized" for patriotic service in time of peace.

H. C. Coe.

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COMMENT AND CRITICISM

HOW TO MAINTAIN INTEREST IN OUR ORGANIZED MILITIA

Six months have now passed since our State troops, cheerfully answering the call to the colors, assembled on the Rio Grande border and devoted themselves to the acquirement of the rudiments of field service. It has been a long, hard grind, but worth while, for more than 100,000 of us have learned, through some trials and tribulations, the principles of soldiering. We are now in the position of the surgeon, well informed in the theory of surgery, who has yet to flesh his knife; no surgeon is he, any more than is a man a soldier who has never faced the hardships of a campaign. Both are prospective efficients—infinitely better than though without theory, as well as practice.

But what are the 100,000 thinking about? Would they go again if the call came? Many of them would and willingly, if necessary to defend the country, though all would think that the other fellow should do his bit too.

Of course, the State troops will maintain their organization and recruitment will be speeded up to fill the depleted ranks. To help along the good cause, THE MILITARY SURGEON takes pleasure in presenting the views of Capt. A. G. Chittick, M. C., Ind. N. G., as to what to do to keep up interest in a National Guard Sanitary Company.

This is *the* problem with every company commander, after his company is a few years old. While we are far from the solution, several methods have been tried and I am reporting them at the request of our Inspector-Instructor for the good they may do and, with the hope, that others may add their experience.

The first necessity is to have your town back of you. Without this the best thing to do is to request the Governor to have the organization mustered out while the record is good. First, through the newspapers we secured the support of the citizens of our little town. This was not done in one year or two, but in seven years we thought we had enough people back of us to ask for a little money from them. We were even more successful than we had hoped. I may say that it has always seemed to me that, up to a certain number of men, the small town is the best place for medical units.

Our method of obtaining money from the business men was a new one, for Indiana, and perhaps has not been tried all over the country. We organized what we call "The Associate Members." The organization is exactly the same as that of a war strength company, consisting of five officers, nine noncoms. and seventy men. To become an associate member, after election, the member pays yearly dues, agrees to visit the armory at least once each year, to recommend the company to any prospective recruit, and to place his membership card in a prominent position in his place of business. In return the company

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gives two "Army" suppers each year, to which all associate members are invited and the company issues bulletins which are mailed whenever anything of interest occurs. This plan not only brings the company some very much needed money, but keeps almost a hundred "live" men of the town interested in what we are doing. They are willing to help in any way they can. This was evidenced this summer when, through their efforts we were able to take forty-two men to our Camp of Instruction, with only forty-six in the company.

In this State each man in any company, receives a small amount for each drill he attends. In almost twelve years we have never paid this to members directly, but have used it for the furnishing and maintaining of club rooms. These club rooms in the armory are open each day from 10 in the morning until at least 10 each night, for members who have attended the last drill of the company. This not only gets the men in the habit of being around the armory, but brings them up to drill sometimes, in order that they may use the rooms the next week.

Whenever any work is to be done about the armory, members of the company are always given the opportunity to do it. Last fall, on account of an increase in equipment, it became necessary to find a larger building. Not only all the moving, but all the repairing, consisting of building partitions, plumbing, wiring, painting, etc, was done by the company. This gives each man a feeling of interest in the work.

To still further increase the attendance at drill, and as an inducement for recruits, we commenced about a year ago to pay a sick and accident insurance. This has been very successful for the company and the members. The expense has been smaller than one would imagine. Feeling that we could give the men "more for their money," we last month issued a new order, increasing the amount paid per day. Under this new order all that is necessary for a man to draw insurance is that he shall have taken the typhoid and smallpox prophylactic and attended the last ten weekly drills of the company. For confining sickness or accident, he is then paid at the rate of $5.00 per week. If he has only attended nine of the last ten drills, the amount is reduced to $4.50, for eight $4.00, and so on down to $3.00 for six drills. While this is not very much, it is a help with the class of men I enlist and since most of them carry other insurance, it reduces the amount they have to pay on it.

To give the men who attend drill most, a reason for still better attendance, the company has been divided into two classes. Class A consists of all men who have attended at least 50 per cent of the fifty-one drills of this year and at least one Camp of Instruction. Class B, embraces the recruits and men who do not attend drill regularly. Their work for the coming year will consist of drills, etc., as outlined by the War Department. Class A, however, will be given advanced work in map reading, first aid, equitation, etc. To make this work more interesting the company has installed a moving picture and steriopticon projector. In the past six months a small machine that is very satisfactory, has been placed on the market and purchased; we believe this will create interest in the company, particularly since we now take a moving picture camera with us on every march, and these pictures are later shown at the armory.

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As the Government requires men to attend a certain number of drills, before they are entitled to pay, we have found the most satisfactory plan to limit enlistments to three months at one time in the year. Our period is from October 1 to January 1 and during this period, monthly suppers are given in the armory to which every member is invited, his pass consisting of a prospective recruit. Here again, we believe, the movies will prove a valuable asset. They will give new men a better idea of camp life than any one can tell them. We have always paid the men for recruits. Not much, just one dollar, but it takes away the idea of working for nothing. To this we attach the requirement that the recruit must attend six drills, for the men to get his money. This serves several purposes. It makes the men see to it that their recruits come up to drill, it keeps the company from losing any money on the recruit, and it gives us time to interest him in the work.

Capt. Chittick certainly has evolved an excellent scheme to interest his company and community, which has proved successful. Such programs as his would help in all our State organizations if earnestly practiced, and should be encouraged, at least, until we have convinced our people that all must serve as soldiers—and even then they must be interested.

Many years ago (1883), the British organized a "Volunteer Medical Staff Corps" on the lines of the permanent establishment, which they endeavored in every way to popularize and support by public contribution through various classes of membership, £5 5s. for life membership, 10s. 6d. annually for honorary membership, etc.

The medical schools organized sanitary companies, as we call them: London had four such, one recruited from Charing Cross, University, Middlesex and King's College hospitals; another from St. Mary's, the London and Guys, a third from St. Bartholomew's and St. Thomas' and the fourth company had no hospital connection. The course of training embraced infantry drill, through the school of the battalion, special drills in first aid and bearer work, lectures in anatomy, physiology, hygiene, minor surgery, practical cooking, etc. And, by the way, these companies were armed with rifles as are all such abroad. In these organizations, too, it was found necessary to introduce numerous features not strictly appertainant to their work. We quote from an old publication:

A bugle and a fife and drum band are in course of formation. Members of the corps wishing to join are requested to send in their names, at once, to headquarters.

Item. During the past season a most successful fancy dress ball was held at the Town Hall, Kensington. It is intended that the ball be held annually.

During the coming winter, No. IV Company has arranged to have a series of Cinderella dances. Each company had a smoking concert during the winter.

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The Volunteer Medical Staff Corps had assigned it the privilege of forming a guard of honor to Her Most Gracious Majesty, the Queen, on the occasion of the laying of the foundation stone of the new Examination Hall on the embankment, etc., etc.

The Commandant announced that classes in fencing, boxing and gymnastics are organizing; that a rifle range is being prepared, so that members of the corps may have an opportunity to practice shooting, "as all are allowed to compete in the general matches"; that a revolver club is in process of organization; and that a theatrical performance is contemplated, the proceeds to be devoted to the purposes of the corps.

These organizations purchased their own uniform and equipment, paid their own way and received little or no subvention from the government.

The extraneous features, fun, helped to make the organization popular among the people and promoted recruiting. But back of it all, of course, was an underlying desire to serve the country.

If we are to adhere to the volunteer system, notwithstanding that our Constitution requires that all fit men shall serve and that presumably, they shall be trained for service; then we must adopt some of the suggested means to beguile recruits for our military organizations.

THE PHYSICAL CONDITION OF OUR MEN.

It is fair to assume everyone would accept as axiomatic, that the primary essential in an army in active service, is a physically sound man. Moreover, that such a man must be neither too young nor too old, and must have reasonable intelligence, sense of duty and capacity for accomplishment.

It would appear that any physician of sufficient attainment to gain a diploma and pass a State examination, should be capable of determining whether or not a perspective recruit possessed these qualities, particularly as the method of ascertaining their presence is laid down *in extenso* in the recruiting orders; but, as a matter of fact, such is not the case, and not even all the medical officers of the State troops proved themselves capable of determining whether or not a man is physically fit to serve.

In Col. Chamberlain's instructive account of "Care of Troops on the Mexican Border" in the *Journal A. M. A.*, November 25, 1916, by the way, the first authoritative public statement of details of Sanitary Affairs in the Southern Department, he writes:

"The first point worthy of note has to do with the physical examination of officers and enlisted men in the National Guard. . . . In the case of the Organized Militia the law provides, when a State certified that it conformed to

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the physical standards of the Regular Army, that its troops should be mustered into the Federal service, without physical examination and that the men should, as soon as practicable thereafter, be examined under the supervision of a medical officer of the Regular service—most of the States reported that they complied with Regular Army standards and their organizations were consequently mustered into the service of the United States

"On examination by the Regular medical officers, detailed for the purpose, however, it was found that large numbers of the officers and men were unfitted for the military service because of physical defects, often of long standing. The proportion so disqualified, varied greatly in different States, but in several reached from 30 to 40 per cent of those mustered in. Aside from numerous instances of diseases, such as venereal infections, tuberculosis, nephritis, heart lesions and epilepsy, there were great numbers who were found to be disqualified because of conditions which could have been detected by a cursory examination; such were under-height, under-weight, absence of teeth, defective vision and hearing, hernias, flat-feet, obvious deformities, immaturity, senility, etc.

"As extreme instances, men blind in one eye, and wearing glass eyes, and one man with an artificial leg had been accepted. . . . Such laxity in physical examination is a fundamental defect in the militia system of many States. A unit which looses at moblization 15, 25 or 40 per cent of its personnel because of physical defects, is seriously handicapped at the outset, by reason of shortage of men, and if it goes into active service still retaining this defective material, the handicap is still greater; such soldiers will fail under the stress of campaign and become a burden on their comrades and on the Sanitary Service.

"In the case of our recent mobilization, a part of the ineligibles were at once discharged from the service at the muster in camps. In other instances the regiments were moved to the border before this could be accomplished, and the defectives have been, or are now being, discharged on surgeon's certificate of disability. The Government has been put to the expense, in each case, of equipping a useless man, transporting him to the border, subsisting him while there and returning him to his home, all through failure of the Militia Medical Officer to maintain a high standard of physical requirement.

"The number of discharges for disability among the Militia in the Southern Department between June 1 and September 30, was 1,174. . . . Large numbers of militiamen who did not come up to the required standard still remain in the service, notably those undersized or those having defective vision and hearing or bad teeth or hernias. Many of the latter have been operated on."

The foregoing is what happened in the Southern Department, where the troops had gone, presumably, ready and hoping for an active campaign. What happened before they left for the border is a matter of official record as well, regarding which information can be obtained by inquiry at official sources. But the shortcomings of our Militia Medical Officers in this particular are not singular, as evidenced by the following extract from a report on the Canadian Medical Service in the *Canadian Journal of Medicines and Surgery*, December 16.

That there has been a woeful laxity, in weeding out medically unfits during

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the process of enlistment and training in Canada, is demonstrated by ample evidence in Dr. Bruce's report. A Canadian pioneer draft arriving in England, June 29, 1916, was found to have 57 unfits out of 254 of all ranks. Of 2,670 soldiers coming before medical boards from June 2 to August 2, 1916, as only fit for permanent base duty, 1,340 ought never to have been at the front. Out of 1,452 discharges from the Army during the same period, 816 had never got beyond England, that is 56 per cent of the discharges had never been at the front.

Unfits in England are a great bother. They take the places on base duty of men who have been at the front and have a prior claim on any soft jobs available. Others clog up the hospitals, increasing the strain on the already overtaxed medical services. And further, Dr. Bruce points out, the question of pension arises. "Men who are discharged for a disability present on enlistment are not entitled to pension for that disability, but where pre-existing disability has been increased at least temporarily by active service, corresponding pension or gratuity must be allowed.

"In the last four months we have had over 1,000 recommended for permanent base duty from over age, with an average age of 49 to 50 years for each man. It is a common occurrence for the men, when questioned as to their given age when enlisted, to make a statement that they gave their true age as 54 or 55 years, as the case may be, and the medical officers said they would call them 41 or 42 years. In one case he was informed by the soldier that, on enlistment, the recruit on giving this proper age was told to run around the block, think over his age, and come back again.

"And again, during the last month alone (this from a report dated August 22), 120 boys were found in the ranks and put on permanent base duty. Their ages run as low as 14 years."

Several pages are devoted to special cases of men who should never have enlisted. Among others, four cases from the Ninety-second Battalion are mentioned by name, two of them being discharged as permanently unfit and two to be put on base duty. "We have been informed," says the report, "that these four men were paraded before a standing Medical Board in Canada by Capt. Maynard, and that they were recommended for discharge, but no action was taken, and they were brought to England."

One man was found with valvular disease of the heart, left hand partly cut off. He was enlisted at Edmonton.

Another Toronto man could not carry pack, suffers from vertigo, weight 105 pounds, chest when fully expanded 30½ inches; medical examiner, Capt. ———, Toronto.

Another case, discharged, congenital amblyopia, right eye vision defective, left eye vision lost. Medical examiner, Capt. ———, Toronto.

A photograph shows a boy enlisted at Pembroke, Ont., stripped, standing opposite a normal man. This boy was 16 years of age, weight 80 pounds, had infantile paralysis, which left his legs in bad shape. He says he passed two medical boards in Canada, having been stripped on both occasions. He has never done any military duty, and has been in the hospital most of the four and one-half months he has been in England.

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Another man was found to have been taken out of a tuberculosis sanitarium previous to embarkation.

Another man was blind in the right eye. His vision in the left is just about one-eighth what it should be. In other words, this man is fifteen-sixteenths blind.

Some units had as many as 25 per cent unfits on arriving in England.

One of the over-age men was found to be 72 years old.

These are samples. The report contains fifteen pages of particulars of this kind, giving the names of the men, names of the medical examiners and full details.

Dr. Bruce recommends stringent changes in the methods of medical examination, in order that the great loss consequent upon the present system may be avoided.

The *National Guardsman* recently published the following:

"According to a statement prepared at the War Department, 14,600 National Guardsmen had been discharged from the service of the Government up to September 1.

"They were distributed among the geographical military departments as follows: Southern Department, 2,916 discharged; Western Department, 341; Central Department, 959; Eastern Department, 10,384.

"The causes of the wholesale discharges are stated as follows: Dependency, 4,919; fraudulent enlistment, 59; physical disability, 9,446; to enter West Point, 2; return to Government positions, 146; return to civil position, 1; sentence of civil court, 1; to accept commissions, 6; paragraph 75, mustering regulations, 1; illegal enlistment, 1; desertion, 3; other causes, 15. Total, 14,600.

"Pressure from political and business quarters is being brought to bear upon Secretary Baker and administration officials generally to withdraw National Guard organizations from the border. Members of Congress, business houses, and friends and relatives of guardsmen have deluged the Department the last few days with requests for the release of the militiamen."

Turning now from the experience of the Militia to that of the Regular establishment, in its efforts to recruit the paltry additional 20,000 men recently authorized, applicants are not lacking; but of these scarcely 10 per cent are found fit. If this condition were confined to the present days of prosperity and was not equally apparent in the State troops, we might be justified in the conclusion that the "fit" were at work and only the floatsam were seeking enlistment. But, as a matter of fact, the proportion of those rejected to those accepted for enlistment is little different from what it has been for many years. Commenting upon this, some one has said, "Either the applicants, as a class represent the physical standards of the country, which are therefore woefully

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poor, or the physical standards placed for the military service unusually high."

As a matter of fact the physical standards are being lowered and the fault lies not with them, but with the material from which recruits must be drawn. This is a matter of more than passing significance to the future of the Republic, and has a direct bearing upon the principle of national preparedness with which much of the best thought of the country is now concerned. Study the physical records of the Plattsburg regiments, the best we have to offer, and we are told the examination was none too strict, and mark the result.

Let us look the whole situation squarely in the face, assemble all the evidence and then act upon it. The time is rapidly passing when we can afford to temporize, and the day is not far distant when we must be prepared to defend our country or cease to have one.

The proportion of physical defectives is much too high and will grow greater if immediate steps are not taken systematically to train our people physically. The preparation should begin in the schools, where every boy must be required to undergo a course in physical culture suitable to his developing years, which *mutatis mutandis*, should apply to the girls as well.

This for the physical regeneration of the citizenry; for the soldiery, every able-bodied citizen, the special training should be continued in decreasing amounts for the accepted periods. "Physical development is the basic factor in preventive medicine," and the first step in national preparedness for peace or war.

ANNUAL REPORT OF THE SURGEON GENERAL OF THE ARMY

The annual report of the Surgeon General of the Army, covering the work of the Medical Department for the calendar year 1915, is, as usual, replete with valuable information. How valuable, from a medical standpoint, must be appreciated when it is realized that the morbidity statistics, practically, are gathered from all climates and conditions of life. From longitude 66° west to 115° east of Greenwich and from latitude 64° north to within 7° of the equator, leaves no climate outside the current experience of our soldiers. So, as the Surgeon General remarks, "The significance of this far extended field of action in its relation to the health and disease of the Army is readily appreciated by the most superficial investigator while to the student of vital and social statistics and their application to the comparative study of races and nations, it assumes a particular importance."

The average strength of the forces, upon which the statistics are

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based, was 103,842 officers and men, presumably as reported by medical officers. The constant nonefficiency from all morbific causes was 25.22 per 1,000, of which 4.37 was due to injuries, a slight increase over the rate of 1914, the lowest ever recorded. The admission rate was 726.19 per 1,000 against 660.45 for the preceding year. (In which connection, it might be asked if this increase of admissions is due to increased morbidity, a change of policy, or the personal equation of the officers holding surgeon's calls.) The death rate, 4.45 per 1,000, was but 5/100 above the lowest record; of this rate 1.92 died from injuries. 14.06 men per 1,000 were discharged on surgeon's certificate, making the losses from all causes 18.03 per 1,000, 1.17 per 1,000 more than the lowest record.

The troops in China gave the highest nonefficiency rate, 31.78 per 1,000, followed by those in Panama, 21.66, the Philippines, 21.42, the United States 20.90 and Porto Rico, 20.57. It is interesting to observe that the lowest rates are Hawaii, 16.20, and Alaska, 6.02. Of course, Alaska has always been lowest, but why Hawaii? THE MILITARY SURGEON ventures the opinion that the reason is largely administrative.

It is a source of congratulation that malaria, which in times past has been a potent cause of nonefficiency, last year gave the lowest noneffective rate in the history of the Army. Of course, everybody knows that this is a perfectly controllable infection and that its results, when its cause is uncontrolled, are very costly in lost efficiency and large pensions. So we repeat, it is a source of congratulation that after all these years of knowing how and yet not doing, the habitations of our soldiers in the tropics are now being more effectively protected against mosquitoes. THE MILITARY SURGEON may well repeat the oft-reiterated recommendation, "There should be no further delay in properly screening all buildings in the tropics occupied as hospitals, barracks or quarters."

Typhoid fever, the *bête noir* of armies, no longer cuts any figure, when proper prophylaxis is used. This is demonstrated by the world in arms and vaccinated against typhoid. Eight cases appeared in our Army in 1915, four of which occurred in Hawaii. The Surgeon General contrasts present typhoidal conditions with those of 1898 which caused half of the deaths from all causes in our Army of that day, 2,774—in 20,000 cases.

The Germans had 75,000 cases during their one-year war with France in 1870. Now, as with ourselves so with them, that disease is negligible. But there are other fevers and infections and these, too, are being vaccinated against abroad with satisfactory results.

The anti-venereal propaganda has been carried on with unrelaxed

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effort. THE MILITARY SURGEON believes that nonefficiency from venereal diseases, probably, has reached a constant level in the Army, 4.6 per 1,000, but "constant" only through watchfulness. To maintain it, there can be no relaxation of the efforts to teach continence and the use of prophylaxis when incontinent; efforts which must be intensive and continuous, to be successful and which add not a little to the work of the Medical Department.

Unfortunately, governmental control ceases at the edge of the reservation and, for the most part, the local authorities are either indifferent to the existence of the traffic, or worse; so prophylaxis and punishment are likely to remain the chief resources in controlling nonefficiency from venereal causes.

The Surgeon General remarks, "The admission and noneffective rates for alcoholism have steadily diminished during the past decade and a half, keeping pace with the general public sentiment and decreased use of stimulants, of this character, among all classes in all walks of life in this country. The Army has banished alcohol from its garrisons and camps and the Navy has eliminated it from its ships and yards. All this before the outbreak of the great war," the contenders in which have decided, "That alcohol and military efficiency have nothing in common and must hereafter be held unqualifiedly antagonistic." It would be interesting to know to how great an extent drugs have substituted the abolition of alcohol in foreign armies.

As to the organization of his Department, the Surgeon General states that by the Act of 1916, for the first time it has been placed upon a satisfactory basis—a ratio of seven medical officers to each thousand of enlisted strength, the increase to take place in five annual increments. This ratio is liberal but none too much so, nor is it based upon all the people the Medical Department will have to care for, since "civilians attached" cut no figure in the calculation.

Seven medical officers per thousand seems a large provision, to those who don't know the requirements. Those who do, appreciate that this number is but 7/10 of what actually will be needed in the event of hostilities. But the Medical Corps has not even these; indeed, it has less than five per thousand. The Surgeon General made a vigorous effort to get the seven he needed, but he failed, even though the law gave this number. THE MILITARY SURGEON believes that the medical profession of the country, which is now being so efficiently "prepared," could do nothing more important in this direction than to see that the Army shall have the prescribed ratio of medical officers, not at the end of five years, but *now*. The present shortage is 470 officers.

The ratios in the several grades are: colonels 3.16, lieutenant colonels

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5.42, majors 23.70, captains and lieutenants 67.72, no change having been made in this respect except that a lieutenant must serve five years before he is eligible for promotion to a captaincy, instead of three as heretofore. THE MILITARY SURGEON does not believe that, considering the age of candidates, the period to a captaincy should have been increased, nor is it of the opinion that the rate of promotion is adequate or equal. With so many junior officers there should be a proportionate number of general officers.

The Dental Corps was reorganized in this law and the Veterinary Corps was established and attached to the Medical Department.

The Surgeon General invites attention to the great library of the Surgeon General's office, the largest collection of medical literature in the world, of inestimable value to the profession and currently used by thousands of physicians throughout our country. Also to the Army Medical Museum in the same building, the collections in which have been largely contributed by the profession generally. These useful organizations are a memorial to the whole medical profession and should be cherished and promoted by it, as its very own.

The report refers to the mobilization of the Organized Militia, 135,000 officers and men. It says:

> This sudden and rapid movement of a large body of partially trained or quite inexperienced troops threw an enormous amount of work and responsibility on those charged with its execution, and particularly upon the staff and supply departments of the Army. To the medical officers of the Army was given the task of making the physical examinations and administering the vaccination against typhoid and smallpox, immediately compulsory on entering the Federal service, under the existing regulations. Their assignment to the different camps as sanitary inspectors and instructors added further to the important duties. It can be fairly said that this mobilization has been accomplished with promptness and with the minimum of disease and discomfort. In view of the general situation and the suddenness of the call there is little ground for complaint of any kind, and particularly from the standpoint of hygiene and sanitation.
>
> The mobilization of the National Guard in 1916 offered a unique and valuable opportunity for instruction to the members of both the National Guard and the Regular Army. The medical officers of both branches have rendered excellent service and the exceptionally low sick rates that have prevailed during the first few months in the combined camps of the border speak in the highest praise of their ability and efficiency.

The Secretary of War, in his annual report, commends the ability and efficiency of the Medical Department in maintaining the health of the Army everywhere at so high a standard. Of its work on the Rio Grande, he says:

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The mobilization of the National Guard on the Mexican border presented to the medical staff of the Army a large and delicate problem. . . . They exchanged home life for crowded railroad trains and crowded railroad trains for hastily prepared camps. They underwent at once an immediate dietary change and as complete a change of habit and occupation. All of the facilities of the health service of the Army were at once devoted to sanitary and prophylactic measures for the safety of these men, . . . with the astonishing result that the sick rate of the combined forces on the border since the mobilization has been less than 2 per cent. This is equivalent to a noneffective rate of 18 per thousand. This I believe to be the lowest noneffective rate maintained in any similar body of men in our history, and I am told that it compares favorably with the best done by any country at any time. The credit therefor belongs primarily to Commanding Officers, the Surgeon General and Quartermaster General and their associates. They have, however, been intelligently aided by the medical officers of the National Guard, and, of course, have had the hearty coöperation and support of the War Department and the use of all the facilities of the other departments of the Government which could contribute to the accomplishment of their task. The result is not only gratifying in that it shows what progress we have made in sanitary science in the Army, but it has given the country confidence in the ability of the military authorities to safeguard the health of soldiers, and an assurance that the inevitable casualty list of military operations will not be supplemented by the horrors of preventable sickness and death, as was formerly the case before preventive medicine had so far wrought its saving service to mankind.

This is certainly a wonderful record, for which THE MILITARY SURGEON thinks the Medical Department can justly claim the largest share, for its campaign of education in sanitary matters, carried on for the last eighteen years, has embraced all branches of the service and extended widely among the citizenry of the whole country.

THE MILITARY SURGEON hopes later to publish a more comprehensive review of the Surgeon General's valuable report.

BUREAU OF MILITIA.

The annual report of this Bureau for 1916 is a brief but interesting exposition of Organized Militia affairs from the standpoint of the War Department and must be read, to a considerable extent, between the lines, if the Militia situation is to be clearly understood by the people. The reported strength of the Organized Militia, June 30, was 8,589 officers and 123,605 men.

THE MILITARY SURGEON does not concern itself, ordinarily, with matters outside its special purview, nor will it in this instance, though the report presents a wide field for comment in many directions. Primarily, the effect of the double oath of allegiance to Nation and State

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is to establish a uniform period of enlistment, further, those who take it require the approval of the United States in all cases of discharge and, finally, no additional oath is necessary when national mobilization occurs. The Good Book tells us what happens to the man who serves two masters.

But what of the Sanitary Troops? The reported strength of the organization, June 30, 1916, was 884 officers and 4,436 enlisted men. This strength, however, has been considerably augmented during the six months on the border. June 30, there were required 48 ambulance companies and the same number of field hospitals, of which 22 ambulance companies, 31 field hospitals and 174 detachments were organized, and since that date 4 ambulance companies and 7 field hospitals. There is at present a shortage of 10 field hospitals and 22 ambulances. In only three States is the sanitary organization complete, Maine, New York and Ohio. Yet it is not improbable that the people of the delinquent States would complain bitterly, if there was the slightest evidence of neglect of their sick soldiers by the Federal authorities.

This chapter of the report is next subdivided under "Instruction and Training." Six medical officers of the regular establishment have been on duty as inspector instructors and fifteen N. C. O.'s, all of whom have shown commendable zeal in their efforts to promote the efficiency of the sanitary troops, "but the number is entirely inadequate to accomplish the desired results." The report continues, "The value accruing to the Federal Government, of detailing medical officers and noncommissioned officers (from the Regular Army) with the National Guard, from the viewpoint of increased efficiency, cannot be overestimated. The money spent in this way will produce results that can not be secured by any other method."

The fact that 60 per cent of the militia medical officers successfully completed the correspondence course is interesting. What could have happened to the remaining 40 per cent? The course was elementary. Field instruction has been intensive for the last six months and the results are bound to show in increased efficiency, and the value of the correspondence course will be, hereafter, the more appreciated by those who have done their bit.

"Armories" and "Matériel" are briefly considered and some space is given to the discussion of "physical examination and training." THE MILITARY SURGEON has referred to physical examination elsewhere in this issue. It portends disaster.

Up to June 30, 1916, 2,481 officers and 24,866 men had been immunized against typhoid. At the time of the mobilization all were immunized, with result that typhoid is negligable in the morbidity

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tables. But for this universal immunization, there is no reason to doubt that the experience of 1898 would have been repeated. In view of what is known to and accepted by the world, on this subject, it might seem that our State authorities are not particularly careful of the health. of their troops at home, since but 20 per cent were immunized when they entered the Federal Service. Nor should they forget that three years is probably the extreme period of immunity.

Not the least important subject treated in this chapter is that relating to the training of the men and development of noncommissioned officers. Without such any branch of the service is handicapped, but particularly is this the case in the sanitary service, where the requirements are so multifarious. Such training and development can come from the medical officers only and yet, the report says, "Little or no efforts have been made to secure capable men as noncommissioned officers . . . and little on the part of the commissioned personnel of the Medical Corps to establish schools of instruction. . . . Examinations for appointments to the grades of sergeant, first class, sergeant and corporal have been of a perfunctory nature and very often the N. C. O. is no more familiar with his duties than is the private. . . . It is believed that one of the most serious defects found exisitng in the Medical Department of the National Guard, called into Federal service," is the lack of training of the enlisted sanitary personnel.

Nevertheless the act of June 3, 1916, no matter its defects, will help to increase the efficiency of the Organized Militia and, besides, so far as the sanitary troops are concerned, as the report says, "The European war has been an important factor in demonstrating to the medical profession and others concerned, that an adequate, well organized, properly equipped and trained sanitary personnel is a national asset in time of war—and that sanitary formations to be useful and fulfill their military functions, must be so organized, equipped and trained in peace," so there is likely to be improvement in this direction.

Finally, the sanitary chapter concludes, "The public not only expects, but demands, that the health and lives of the soldiers be properly safeguarded." One might think so and yet, 80 per cent of the Militia were not immunized at home, while under the eye of their own people. Only when the General Government took them over were they protected, with the probable result that several hundred of them are alive today, who would not have been, had the Federal authorities received them, as the States were apparently willing to turn them over. Had the several hundred died from typhoid, would the people have blamed themselves or their State? Hardly. The General Government would have been held responsible.

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The conclusions to be drawn from this chapter on sanitary troops are, that there is yet room for improvement, and from the report as a whole, that State rights rather than State obligations actuate the people towards their State forces. Furthermore, notwithstanding little encouragement and less appreciation by their neighbors, who are apparently quite willing to let the other fellow serve without helping to make that service efficient, the good work done by the Sanitary Department of the Militia, deserves and should receive, the commendation of the whole country.

ANNUAL REPORT OF THE SURGEON GENERAL OF THE NAVY

Surg. Gen. Braisted's report covering the operations of the Bureau of Medicine and Surgery in 1915, comes to the editorial table laden with evidences of the varied activities of our naval medical officers the world round.

The total strength of the Navy and Marine Corps is reported as 68,075. There were 65,074 cases treated, a rate of 955.91 per thousand, of which 305 died and 1,272 "were invalided from the service," 18.68 per thousand, a term presumably equivalent to the armies "discharged on surgeon's certificate of disability." The total sick days numbered 776.203 and "damage"[1] 2,914.55.

The morbidity and mortality rates per thousand are somewhat higher than during the last decade, the admission rate being 955.91 against an average of 832.85 for the preceding thirteen years. This rate, however, is only suggestive at most, as the personal equation of the medical officer is a large factor; the real index of morbidity being the "damage" or, as the Army has it, "constantly non-effective."

It is observed that the "sick-day" rate per thousand 11.40217 is somewhat above the average. By the way the printer has slightly garbled the table on page 5; we are informed that the total "sick-days" column also gives the rate per thousand, as is shown on page 91, from which it would appear that the rate for 1915 is, as stated, 11.4017, approximately 11½ days, a very gratifying showing. The slightly increased morbidity is due to tonsilitis, venereal diseases, malaria, mumps and bronchitis.

The death rate 4.48 per thousand is a fraction higher than for the last three years, but lower than for the decennium previous to 1912. Pulmonary diseases caused the greatest mortality, fifty-eight deaths, fifty-one were drowned and thirteen died from gunshot wounds. It is

[1] The report defines "damage" as "in terms of individuals whose loss of service by sickness, discharge (presumably for disability) or death, would be represented as continuous throughout the year." For further explanation see Naval Hygiene, Gatewood.

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interesting to observe that the Navy death rate is about half that for the same class of men in civil life. Remarking upon this Gen. Braisted says: "I doubt if the families, parents or guardians of the young men who enter the Navy, realize how carefully guarded, as to health conditions, these young men are."

Venereal diseases, as usual, head the list and show little change of incidence since the inauguration of the anti-venereal campaign. It is presumed that the Navy, too, has about developed its constant in these diseases.

The morbidity statistics of the Naval Academy are interesting. The average strength of the corps of midshipmen was 1,428. There were 1,730 admissions to the sick report and 120 re-admissions, totaling 3,589 sick days, a rate of 9.83 per thousand constantly nonefficient, against 6.12 for the previous year. Of the total sick days 492 were from injuries in 284 admissions. Influenza was the chief cause of admission causing nearly half of the total sickness. One hundred and forty-seven days were lost on account of football injuries, also an increase over the previous year. Seventeen cadets were invalided from the service; three died, all from accidents, two of them while absent, the third was drowned. "There were 25,796 visits of midshipmen to sick quarters, causing a 'damage' of 2,728 sick days, and 2,852 days on the excused list." Four hundred and ninety-four midshipmen were vaccinated and 795 immunized against typhoid fever.

The free use of excellent milk has caused the best results. "The average gain of the present Fourth Class was 7 pounds per man from entrance in June and July to the first of October." But was this all milk? There is a valuable tabulation of physical conditions found in the midshipmen.

Passing to other features of this interesting and instructive report, we find that the problems of heating and ventilation in the newer ships are still troublesome. They probably will continue so. So many factors enter into the making and management of these leviathans, that almost every one of them must compromise the best with the practicable.

Extracts from informing reports from naval hospitals and stations are well worth comment did space permit.

Gen. Braisted can, as he does, very properly congratulate his corps on the excellent work done by his officers detailed as observers with the belligerents, whose reports, so far as we have been able to see them, are of great value. He also remarks upon the fact that the duties of his department are increased by the responsibilities in connection with the large civilian force employed in the various yards, etc.

Perhaps the most important adventure is the taking over of the

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sanitary responsibilities of Haiti and Santo Domingo. This is a wide departure from precedent, but the work is sure to be well done, will greatly benefit the communities and broaden the outlook of us all; for each of the public medical services profits in experience and prestige by the good work of the others.

Then come recruiting, hospital corps, publications, personnel, each a chapter worthy of comment and all comprising a report which should be read as a whole to be fully appreciated and which is well worth the reading.

ANNUAL REPORT OF THE SURGEON GENERAL OF THE UNITED STATES PUBLIC HEALTH SERVICE

Wonderful indeed are the activities of this service, and the story of them, set forth in General Blue's Annual Report for 1916, in brief official terms, must be read between the lines as well, if their value to our people and humanity generally is to be fully appreciated. THE MILITARY SURGEON hopes to be able to present a comprehensive review of the work in a future issue.

The report reached the editorial desk just as we were going to press, and this notice is simply to whet the intellectual appetite of our readers for the good things to come.

ERRATUM.—The type in our December issue, page 684, made the editor say in regard to the number of Militia Medical Officers on the border, that, "Probably 3,000 is a fair estimate." Of course 1,000 was intended. The report of the Bureau of Militia Affairs gives 884 as the strength June 30 last and adds, "This strength, however, has been considerably augmented during the last six months."

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CURRENT LITERATURE

Anesthesia in Human Beings by Intravenous Injection of Magnesium Sulphate, by Charles H. Peck, M.D., and Samuel J. Meltzer, M.D. New York: *Report Jour. Am. Med. Asso.*, October 14, 1916. Vol. lxvii, pp. 1131–1133.

Although the authors, in the paper before us, confine themselves to reporting simply "the course of anesthesia, during three operations performed on human beings, exclusively, under the influence of intravenous administration of magnesium sulphate," the article is of great interest from many different viewpoints.

That simple chemical substance, $MgSO_4$, after having been limited in its therapeutic use, for many years, to producing a watery stool, when given by the mouth, has developed a remarkable history, since Meltzer, some eighteen years ago, first demonstrated to the members of the American Physicians Society at New Haven, that an intracerebral injection of only two drops of a 5 per cent solution of it in rabbits, produced complete anesthesia and relaxation of the animal lasting several hours. Even regardless of its possible potential practical application as an anesthetic in the surgical practice of the future, its physiological effects on living tissues must be regarded as quite remarkable, when we take into consideration the decided differences in the effects produced, according as it is administered intraspinally, intravenously or intraenterically.

When the salt is administered by the mouth, or, when it is introduced into the cerebral cavity or that of the spinal cord, through lumbar puncture, its primary effects on the tissues, with which it comes in immediate contact, seem to predominate. When it is introduced intravenously, when, in other words, we immerse every organ and tissue of the animal organism, as we are want to do at seaside laboratories with the ova and larval forms of marine animals, into a fluid medium the chemical composition and normal toxicity of which were changed and rendered different from normal blood, under the influence of which alone these can be expected to function normally; when under such conditions the abolition of consciousness and complete anesthesia still predominate, then we may agree with the authors, when they believe that the effects of the salt, as manifested during the three operations, are principally and primarily central and only secondarily and in a minor degree peripheral.

Again, it appears to the reviewer, if the peripheral nervous structures were affected in the same manner as the central nervous elements, it would be strange and rather difficult to explain why magnesium sulphate should not prove itself equally efficacious as a local as well as a general anesthetic.

H. G. Beyer.

Magnesium Sulphate in Tetanus Following Gunshot Wounds, by J. A. C. Colston, M.D. *Bulletin of the Johns Hopkins Hospital*, Baltimore, October, 1916. Vol. xxvi, No. 308, p. 294.

"Tetanus, during the early part of the present European War, was a frequent and fatal complication, particularly, of wounds caused by shell-fragment."

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The preventive inoculation with antitetanic serum of all such wounds on the battlefield was followed by a rapidly diminished number of tetanus cases in the hospitals at the base. We have here a demonstration, on the largest scale imaginable, of the efficacy of the early prophylactic use of antitetanic serum against the almost invariably fatal results of the toxins of the tetanus bacillus, while the later inoculations were, in the great majority of cases, powerless in preventing a fatal issue. It is, therefore, reasonable to assume that such inoculations will remain the routine practice on the battlefield and to hope that tetanus will gradually disappear as a complication of all gunshot wounds.

Of the six cases published by the author, No. 2 is regarded as the most instructive and may, therefore, be cited in full:

"Case 2.—Alfred X., aged 40, was brought to the temporary hospital at the Palais d'Hiver on November 3, having been wounded seventy-two hours previously by shell fragments. He had received no antitetanic serum before admission, and none was given after his entrance, on account of the limited supply. Examination revealed an infected wound of entry on the posterior external aspect of the right buttock. There was no wound of exit. The roentgenograms showed a fragment of shell lying external to and about 5 cm. below the iliac crest. The wound did not drain well and signs of a localized infection developed, with a gradually rising temperature. On November 8, under chloroform anesthesia, the wound of entry was enlarged, an abscess evacuated and the projectile, with some fragments of clothing, removed. The wound was irrigated with salt solution and free drainage assured by means of a tube. The temperature promptly fell to normal and a satisfactory convalescence seemed assured.

"On November 12, nine days after admission and twelve days after being wounded, the patient complained of cramp-like pains in the right leg and slight stiffness of the jaw. Ten cubic centimeters of antitetanic serum (Pasteur Institute) were injected intramuscularly. The next morning the stiffness of the jaw was more pronounced and tonic spasms of the leg were more frequent, with a general increased activity of the reflexes. The wound was opened widely, swabbed out with iodine and irrigated with potassium permanganate solution. No retention of pus was found. During the day three more intramuscular injections of serum were given, together with large doses of sodium bromide and chloral hydrate. During the next three days this treatment was continued, the patient receiving the 30 c.c. of the serum per day. The symptoms, however, became progressively worse and general tetanic convulsions and opisthotonos supervened. During the more severe spasms respiration ceased and cyanosis became pronounced. As these spasms were becoming more frequent and longer in duration, it was feared that a fatal result might occur at any time from spasm of the glottis. A lumbar puncture was done on November 16, chloroform being necessary to produce the necessary relaxation. Ten cubic centimeters of clear fluid under slight tension were withdrawn. Using the dosage of 1 c.c. for each 25 pounds of body weight, as advised by Meltzer, 6 c.c. of a 25-per cent magnesium-sulphate solution was slowly injected, the head being kept slightly elevated to avoid involvement of the respiratory center. The

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respiration immediately became slow, shallow and irregular, but at no time was artificial respiration necessary. No appreciable effect was noticed on the heart. Several hours after the injection the temperature rose to 104° F. The patient remained deeply unconscious and completely relaxed during the next thirty-six hours. At the expiration of this time slight general contractions again appeared, but severe general spasms were absent, and, as respiration was unimpeded, no further injection was deemed advisable. Catheterization and nasal feeding were necessary for six days following the injection. The patient slowly recovered consciousness, was later able to take food by mouth, and regained control of the bladder and intestine. No contractions were noticed after the fifth day following the injection, and by the seventh day the rigidity of the jaw had completely disappeared. Stiffness in the right leg remained, however, for about six weeks, and convalescence was delayed by a somewhat severe bronchitis."

The above cited case demonstrates (1) the apparent uselessness of the employment of all nonspecific disinfectants, whether applied locally or generally; and (2) the more decidedly beneficial effects of the judicious and timely employment of magnesium sulphate, intraspinally administered, according to Meltzer.

H. G. Beyer.

Mortality in the French Army Hospitals

The following interesting table of mortality in the French Army occurring in the hospitals throughout France, has recently been brought to the attention of The Military Surgeon:

Rate per thousand	Date																		
	1914					1915											1916		
	August	September	October	November	December	January	February	March	April	May	June	July	August	September	October	November	December	January	February	March	Average
Dead from disease	16	20	49	52	45	38	35	24	23	23	14	15	15	13	11	16	12	15	17	16	23
Dead from wounds	53	58	44	39	26	24	24	31	29	34	22	22	14	12	28	14	11	11	10	21	26

It appears that the death rate in the hospitals in Paris in times of peace is 106 per thousand. In the Crimean War the French lost 367 per thousand from all causes and in the Italian War 85 per thousand. The particularly interesting feature about this table is the decrease of mortality from disease and wounds as the war progresses. During the first twelve months the average monthly mortality rate for disease was in round numbers 29 per thousand and for the succeeding eight months 14 per thousand. From wounds, 34 per thousand for the first year and 15 per thousand for the first eight months of the second year.

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BOOK REVIEWS

Practical Bacteriology, Blood Work and Animal Parasitology, by E. R. Stitt, A.B., Ph.G., M.D., Medical Director, U. S. Navy; Head of Department of Tropical Medicine, U. S. Naval Medical School. Fourth edition. Cloth. Price, $2 net. Pp. xvii + 497, with 4 plates and 115 other illustrations. Philadelphia: P. Blakiston's Son & Company, 1916.

That this book has gone to the fourth edition in seven years is sufficient evidence of its popularity. In the fourth edition new material has been added to practically every chapter, and some of the chapters have been almost entirely rewritten. Appendix D, on Diseases of Unknown Etiology, has been enlarged and made into a new chapter on Diseases of Unknown or not Definitely Determined Etiology. In the appendix, new sections have been added on Chemical Examination of the Blood, and Chemical Examination of Duodenal Juice; and the section on Chemical Examination of the Feces has been omitted. A number of new illustrations of animal parasites have been substituted for those in the third edition.

The entire work has been revised and brought down to date, and the newer tests and methods have been included. The descriptions of the tests and methods are concise and clear, and the work continues to be an excellent laboratory guide.

Eugene R. Whitmore.

International Clinic, a quarterly of illustrated Clinical Lectures and especially prepared Original Articles on Treatment, Medicine, Surgery, Neurology, Pediatrics, Obstetrics, Gynecology, Orthopedics, Pathology, Dermatology, Ophthalmology, Otology, Rhinology, Laryngology, Hygiene, and other topics of interest to students and practitioners by leading members of the medical profession throughout the world. Volume III. Twenty-sixth series, 1916. Philadelphia and London: J. B. Lippincott Company.

The contents of the present volume are arranged under the following heads: Treatment, Diagnosis, Pediatrics, Dermatology, Psychiatry, Surgical, Historical.

Under "Treatment" there is a very clear and practical article on the "Medical Uses of High Frequency Currents," by Dr. Frederick de Kraft, of New York City.

In the section devoted to "Diagnosis" are two very good articles on the use of the X-ray in the diagnosis of pulmonary tuberculosis, and the conclusion of an interesting paper on Dysthryoidism by John M. Swan, M.D.

A valuable paper on the "Schick Test" and its application by Dr. Borden H. Veeder, of St. Louis, appears in the section of Pediatrics.

In the section of "Surgery" there are instructive articles on "Cholelithiasis," "Anesthesia" and other subjects.

This volume is up to the standard of its predecessors.

Charles F. Mason.

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Bonne's Syphilis and the Nervous System. Translated by Ball. Philadelphia J. B. Lippincott Company. Four hundred and fifty pages. Price, $4.

This is the second American edition which is translated from the third German edition by Dr. Charles R. Ball, of Minneapolis. The name and reputation of Dr. Ball are sufficient to insure that the subject matter would not lose in translation. Some of the more noticeable changes are in the chapters dealing with paresis, tabes, the sero-biological reactions, and therapy.

Throughout the work the author goes rather fully into the differential diagnosis of the diseases whose manifestations are closely allied to syphilis, as well as those conditions depending upon it. The book is rendered more interesting and instructive by the frequent citation of cases, drawn from the author's vast experience, to exemplify the various points discussed. Perhaps one of the reasons for the popularity of this book, is the logical arrangement and discussion of the entire subject, even to the more minute details. In this connection, several generalizations are quoted, which may well be kept in mind: "Syphilis of the nervous system produces no symptom or combination of symptoms which might be called forth by other causes. . . ." "The proven presence of syphilis does not necessarily indicate that any abnormalities present, are necessarily due to that disease. . . ." "The success or nonsuccess of anti-specific therapy is only conditionally to be regarded as a means of differential diagnosis."

It is interesting to note that while Nonne, Oppenheim and other foreign writers describe the basilar type of meningitis as being far more common, some of our American observers are finding relatively quite a little syphilitic meningitis of the convexity.

He cites a case of well-marked Argyll-Robertson pupil, in an undoubted syphilitic, which, post mortem, showed normal spinal fluid and absence of syphilitic manifestations of brain and cord. He reports, in his nineteen years, experience, four cases of paresis in which recovery took place. In explaining the cause of tabes the author holds to Strumpell's toxin theory, rather than to that of Marie's meningeal origin. The chapters dealing with diseases of the peripheral nerves and hereditary syphilis, are both especially interesting, as is his excellent description of syphilitic blood vessel pathology. The book is adequately illustrated and in such a manner as to add considerably to the value of the text.

In his discussion of the Wassermann reaction, he pays little attention to the provocative reaction, and does not seem to attach much importance to the human element in the laboratory, or the possibility of accident influencing the findings. While not exhaustive, his discussion of the laboratory examination of spinal fluid is satisfactory. It was rather a surprise to note that he recommends the use of syringe pressure in giving intraspinal medication.

This book should appeal to the general practitioner as well as the specialist.

M. A. Reasoner.

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CONSTIPATION, OBSTIPATION AND INTESTINAL STASIS, by Samuel Goodwin Gant, M.D., LL.D., Professor of Diseases of the Colon, Sigmoid Flexure, Rectum and Anus in the New York Post-Graduate Medical School and Hospital. Second edition enlarged. Octavo of 584 pages, with 258 illustrations. Philadelphia and London: W. B. Saunders Company, 1916.

This is a rather voluminous work on a subject which is attracting increasing attention in recent years.

The author's enthusiasm regarding his specialty leads him to make statements regarding the possible results of intestinal stasis, which are rather too comprehensive to meet with the approval of the general practitioner. For instance he mentions syphilis (!) as "one of the more serious complications and results caused by bacteria (infection) and toxic agents arising from intestinal stasis."

He emphasizes the success of the non-medical and surgical treatment of these affections, and the benefits to be derived from psycho-therapy, diet and such physical measures as massage, mechanical vibration and electricity; he believes that surgical measures are too often resorted to, with the result of failure when less radical measures might succeed.

The author thinks that too much importance has been attached to "Lane's kinks" and to pericolic membranes as causes of intestinal stasis.

In his chapter on dietetic treatment it is noted that fruits are listed under the heading "foods permitted," as well as under the heading "foods prohibited."

As to the make-up of the book itself, the highly glazed paper causes very unpleasant reflection from the pages.

CHARLES F. MASON.

A PRACTICAL TREATISE ON DISORDERS OF THE SEXUAL FUNCTION IN THE MALE AND FEMALE, by Max Huhner, M.D. Philadelphia: F. A. Davis Company, 1916. 8vo, 295 pages.

This book takes a new view of an old subject, and states it clearly and well. It is a study of sexual disorders by a genito-urinary specialist instead of the usual one by a neurologist. The author holds that while the diagnosis of these diseases can and should be made by the neurological specialist, the latter is not competent to treat them, in most cases, the necessary treatment being usually local, and requiring long experience in and familiarity with local pathological conditions.

He maintains that even genito-urinary surgeons are usually not acquainted with the apparently slight lesions which often cause the most serious symptoms.

CHARLES F. MASON.

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CORRESPONDENCE

OUR PARIS LETTER

COMITE FRANCO-AMERICAIN,
CONTRE LES IMPOTENCES FONCTIONNELLES,
Paris, le 25th of November, 1916.

The Editor, THE MILITARY SURGEON,
Washington, D. C.

I today received the copy of THE MILITARY SURGEON, which you so kindly sent me, and which contains the article on my Wing Support. you were good enough to print; I thank you very much and hope that it may help some surgeon with his cases; it certainly has rendered service here in France, and will in Roumania, for I have sent several dozen there with the French missions that have gone out lately.

I am preparing a set of my splints for Maj. Church to send to Washington and have already given him many drawings; he says he wants all that I will give him. Naturally I shall give him all that he wants, for I certainly wish to help my own country if I can in any way.

Since writing you of my Wing Support, I have found how to do away with plaster for the jacket and also have perfected the splint for extension of the humerus, making it right or left, so it will do for any case. As soon as I can have the drawings or photos made, I shall send them to you, for they may be of interest.

The French Government has given me a draftsman, so that every piece of apparatus put on a man can be properly recorded. I have promised a complete set of these records for the U. S. A. I take as much of the medical record as I can secure, then note the condition of the man when he comes to me and make a drawing of the appliance that I put upon him. Every day I do something new, how I do it I do not know; but when one is interested and wants to see these men returned to their families as bread winners, one just has to find a way, that is all there is to it; and so far I have succeeded, where the man had any nerve left to work to.

After making five or six different kinds of hand drop appliances, I have at last conquered. I bought every appliance of this kind that I saw and tried them all; none was satisfactory; there was something wrong with every one; now I have it. The appliance is simple, metal, small, interferes in no way with the use of the fingers and presses nowhere; I have it on three men now, but will not report it in detail until I am sure there is nothing to change. When in order, I shall send it to Dr. MacWilliams and he can send it to you if you want it. I have also two new forearm splints, one for bed cases and the other for ambulatory cases; both these work and are in use in several of the military hospitals. Besides I have a universal adjustable double incline for the leg, this too has been tried out. Then I have made modifications of the Hodgens splint and the

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method of suspending it. The first report that I had on this new suspension was from a medical colonel; he had reduced a fractured femur, compound, 12 cm. in ten days with perfect position. He sent me in a radiograph of a bad elbow case and I am going out tomorrow to put the case up in a special splint that I have for elbows that are shot away.

It may interest you to know that I made the Hodgens splint without ever having heard that Dr. Hodgens had existed. The thing that surprises me is, that so many tell me that almost all of my splints are new.

I am now working on three cases of ununited fractures of the humerus, with loss of bone substance of from 4 to 12 cm. and I think that I have the solution of the problem. None of these men has the periosteum left, so they cannot be grafted, the doctors say. I do not pretend to know the operative end of the work. Two of the men have none of the nerves cut, but the third one has; the latter's arm has been hanging useless eight months. I have him now so that he can raise his arm to his head and with my new hand drop, he is able to roll a cigarette and work my mechanical riveter, which requires a good deal of strength. Needless to say he is a happy man. I make a temporary appliance, keep modifying it according to progress, and then finally when satisfactory, it is nickled and properly made and padded. I have one or two things to work out yet with these men and when I have done that, I shall know exactly what to do, at once, with the next cases.

Another case is interesting, it is that of a man who has lost the use of his biceps. I shall put the final appliance on him tomorrow, with it he can use his arm in every way except turning it from side to side; but then one cannot do the impossible, although to my three cases, mentioned above, I have been able to give them every motion. Two of them already had the regulation orthopedic appliances; they heard of me through a friend and came to me for help; they are reformé, so are discharged from the doctor's care.

For most of my leg cases I use Dr. Sougues' method, with modifications; Jones' system requires special shoes, in so many cases, an extra expense for the men in after life, so I try always to use an ordinary shoe and fit my appliance to that.

I am not going to bore you with all my cases; mother says that I think of them all day and dream of them at night. I guess that is pretty nearly the truth.

I left the American Ambulance to give all my time to the French formations, and since leaving, have seen more kinds of cases than I ever saw there, even though I did see 6,000 there. I have developed six new useful splints in the last month, when I could spend more time in my shop. I had to train a new set of men, they are mobilized soldiers; at first they were a little skeptical of my ability, but when I took their tools and made the thing myself, without a drawing, they commenced to "eat out of my hand," and now they never question any little quirk that I want in the metal.

I wish that you might see my plant, it is in studios, I feel more at home in studios than I do in ordinary rooms, one has machinery, one is for the aluminum work which is done by artistic metal workers, women artists, another is for

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padding and painting the splints, and the fourth is mine, where we have the offices and my clinic.

Isn't it funny? It strikes me so, every time I get an order from a doctor, he simply says "please fix this man." I get all the cases from the Pitié, Dr. Walther, one of the best reparatory surgeons in France; he was very skeptical in the beginning about sending his men to me; he sent me two men, and when he saw what I did for them, he now sends me one or two a day. I have not had time to go up to his clinic yet, but hope to in a few days; I have my clinic in the morning and in the afternoon go to hospitals to put up bed cases. I have a wonderful assistant, Miss Helen King, the best trained nurse that I ever saw. Dr. Tuffier sent for me the other day; I went, took the measures and orders, prepared the appliances, and Miss King went out the next day and put them up.

If we ever have war she would be a wonder for our Army. Most of the nurses, that I have come in contact with, know but little about mechanics, as also I find is the case with most surgeons. I think after the experience I have had, I could pick a wonderful corps of workers for a hospital. As soon as the armies go into winter quarters I am going to make a round of all the orthopedic centers. I have been trying to get to Amiens this past month, but while I have had my passes, I have not been able to go; I think that the doctors up there will get tired of waiting for me, but I am only one woman, who is pretty tired after twenty-eight months' constant service, and I can only do so much.

Well, I will stop; I did not start out to write a volume, only to thank you for your extreme kindness to me, a novice in the work.

I have asked Dr. MacWilliams to order copies of THE MILITARY SURGEON, which he has no doubt done. I prefer copies of the magazine itself, for they will go mostly to French doctors, who ask me every day if I have written of any of my splints; they read English and I hope will become interested in THE MILITARY SURGEON and subscribe for it.

Would it be of interest to the surgeons in America, if I sent you some of my special case histories, etc., and the appliances? The *Dental Cosmos*, I believe, is printing the dental cases of Dr. Hayes at the American Ambulance. I am not as egotistical as I may sound, but when one is placed as I am, and big Frenchmen come to me and ask for my things and want reading matter, too, I thought that perhaps the men at home also would like to know what I am doing.

I have been asked to make a cheap peg leg for a farmer, so many are needed, one that will not sink in the soil; I think that I see how to do it, but I have not had time yet, I have such a lot of ideas in my head, but it takes time to get them out, and I have not enough workmen to do much research work and do the daily work too.

Now I really am going to stop as it is past midnight and I have a full day tomorrow.

Again thanking you,

I am faithfully,

GRACE GASSETTE.

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OUR PATIENTS LOYAL

The following letter recently received in the office of the Surgeon General of the Army indicates that THE MILITARY SURGEON was right in its prediction that the patients would not forget their soldier surgeons:

ALBANY, N. Y., December 3, 1916.

MY DEAR MAJOR NOBLE:

Needless to say this is not an official letter, but I did feel I would like to write you a few lines personally to express my appreciation of the gracious act on the part of the Medical Department in granting me a month's leave of absence upon my return home, which time expires today.

Since my return to Albany I have been kept more than busy with professional, especially surgical, work. The patients seem to have saved up their hernias, fibroids, goitres, etc., during the long summer months, evidently awaiting an "Army Surgeon's" attention. It is very gratifying and shows me that my patients are loyal and realized the military emergency that took me to Mexico in July. I am convinced that a man loses nothing in the long run by giving up his time to the Service.

Do you know I feel real homesick at times for Field Hospital No. 7—there is something very fascinating about army life in the Field. Poor Mexico, they are certainly having a very serious time in Chihuahua. I wonder if our troops will yet get into it. If so, I certainly want to go right back to the zone of the advance; no "inactive list" for mine when the time comes.

Thanking you for your many courtesies, I am,

Sincerely yours,

H. D. COCHRANE.

SOME NEWS ITEMS

We are informed that at the December meeting of the New York State Division, Medical Reserve Corps, Maj. Harold Corbusier, M. C., New Jersey National Guard, read an interesting paper on "The Soldier's Foot and Shoe,"[1] which provoked a lively discussion, as most of the officers present had had practical experience with this important subject in home camps and on the border. Lieut. C. K. Tullidge, M. C., Pennsylvania National Guard, related his observations on the foot-gear of soldiers in the Austrian and German armies during the present war. At the January meeting a paper is promised on "Roentgenology in War" and one by Dr. Lyle on the "Carrel Method of Treating Wounds," both of which are expected to be illustrated by lantern slides.

First Lieut. Alfred R. Allen, M. R. C., U. S. Army (inactive list), has been commissioned Major of Infantry, Officers' Reserve Corps. Maj. Allen was a most efficient medical officer, and is a distinguished neurologist in Philadelphia. We understand his examination was of unusual excellence.

Lieut. Col. G. A. Sminner, M. C., U. S. Army, was elected Fellow in the American College of Surgeons at the last annual meeting in Philadelphia.

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[1] See THE MILITARY SURGEON for November, 1916.

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REPRINTS AND TRANSLATIONS

A NOTE ON HOSPITAL SHIPS AND THEIR FUNCTIONS

By Acting Staff Surgeon A. VAVASOUR ELDER, R.N.V.R.

AS in other branches where preconceived ideas had been formed or upon which thoughts had but lightly rested, the events of the War in various parts of the world have clearly demonstrated several points in regard to hospital ships and their functions.

It is admitted that hitherto experience with hospital ships on a large scale has been limited and such of it as there is, has been more of a medical transport nature, than that of naval war conditions. Consequently preconceived ideas which proved faulty, or absence of any definite ideas at all, are not to be wondered at.

Briefly, the functions of a hospital ship must be considered from two separate and entirely distinct standpoints:

(*a*) In time of peace.

(*b*) In time of war.

Under war conditions again two separate phases must be recognized:

1. Pre-battle.
2. Post-battle.

PEACE CONDITIONS

The moving of naval bases occasioned by change of military policy, makes the establishment of medical resources in conformity with such, a matter of great difficulty at times. In dealing with this problem there is also the expenditure to be considered, which is entailed in constantly building suitable base hospitals, for use until the turn of the wheel causes another change of base, with whole or partial disestablishment of previous ones.

A fleet being mobile and self-contained, capable at the worst of proceeding to establish bases pending the development of new ones, it is obvious that the best way of meeting its hospital requirements must be in a similarly mobile manner, *i.e.*, by hospital ships.

It was these changing conditions in peace time which led to the institution of hospital ships to accompany a fleet. It was the *fons et origo* of the system. War conditions did not primarily enter into the main idea.

While accompanying and attached to a fleet, a hospital ship acts as a "base hospital" to that fleet. When full of cases requiring dif-

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ferent or prolonged forms of treatment, it automatically assumes the function of an "ambulance" ship in conveying such cases to hospital on land. She is no longer a "hospital ship" *per se*, but becomes a form of marine medical transport, or in other words a "Marine Ambulance."

Thus, under peace conditions a hospital ship is nothing more than a mobile fleet-hospital-base endowed with "ambulance" facilities for use when circumstances require. Under this must be included, also, the oversea transport of sick from foreign stations, when the ship is really employed as an "ambulance" ship, conveying patients to hospital at home.

WAR CONDITIONS

Under war conditions the function of a hospital ship does not differ so much from peace routine, although for purposes of clearness it may be described as two-fold: the pre-battle and post-battle function.

The presence of a hospital ship at or in the vicinity of a naval engagement may be looked upon as being so impracticable and unlikely to occur under average conditions—if such term can be applied to naval engagements—as to need no consideration, for the following reasons:

An action is fought at varying speeds, all of which are above that of an ordinary hospital ship. Consequently, she would soon be left astern in any attempt to keep up with the combatants.

Assuming an action to be fought within the speed limit of a hospital ship, then her presence amongst the fighting ships would certainly be open to question by the enemy, to say nothing of the danger to herself within the firing zone.

To what extent a hospital ship would be of use afterwards, on the site of an action, is also very problematical. First of all, it may be stated that except under most unusually favorable conditions of weather, which certainly cannot be relied upon to obtain, the transfer of wounded from a fighting ship to the hospital ship by boats in an open sea is so slow, and attended by such difficulty, as to make it impossible on any extensive scale. Likewise, all schemes of overhead transfer on the "coaling at sea" principle are impracticable when applied to human wounded. A sack of coal may be accidentally submerged without further consequences, but not so a cot with a wounded man on it.

The second point is that a fighting ship, whole or damaged, dare not heave-to for the purpose of transferring her wounded in the open sea on account of danger from hostile submarines. Neither could a hospital ship attempt to tie up to a fighting ship for the same reason, granted weather and other conditions permitted it. Hence, it follows that all

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fighting ships surviving an engagement will be compelled to make for the nearest base and transfer their wounded on arrival, or failing that, they will have to be beached at the most suitable places.

The only type of vessel which could possibly be of any use on the scene of a recent action might be termed a "Rescue" ship. For this purpose she should be duly registered under the Geneva Convention, and be a fast, shallow-draft vessel of about 500 tons, with unencumbered decks and low freeboard. In addition to medical staff and first-aid equipment, she should be fitted with appliances for enabling survivors to be easily and quickly picked up out of the water and off wreckage and flotsam floating about, and thence rapidly conveyed to port. A flotilla of obsolete destroyers might conceivably be so fitted and used. An ordinary hospital ship of the usual type is too big and unwieldy, in addition to being too slow for this class of medical salvage work.

Hence, under war conditions, the functions of a hospital ship are strictly confined to the pre- and post-battle periods. In the former, the ordinary peace routine obtains; that is to say, a hospital base is provided for the expectant fleet wherever it happens to be stationed. If a change of base occurs, then the hospital ship follows the fleet, or perhaps may go ahead of it, according to circumstances. Enough hospital ships should be allocated to each squadron to supply normal requirements in the way of "available beds," and to allow for refitting of the ships themselves.

In regard to the post-battle period, and accepting the fact that the surviving fighting ships must return to a base for military reasons, coal, ammunition, stores, etc., the function of a hospital ship changes from a "base hospital" to that of a "clearing station."

The usual accommodation of a hospital ship allows for very little expansion beyond the established complement of beds, taken as an average of 250, if patients are to be efficiently treated and cared for. It is not like a hospital on land to which an annex may be added temporarily when required. The bed-capacity is limited by the structure and size of the vessel, which are not expansive.

Under peace or pre-battle conditions, cases are admitted on board leisurely in two's or three's, perhaps twenty per day at the outside. When the ship is full, she discharges into the larger base hospitals through the medium of ambulance trains.

After an action, conditions are immediately changed. There is a sudden influx of cases, many of which may not be serious, but nevertheless, all will require some care and attention. Any attempt on the part of the ship to act as a "base hospital," and overcrowd, perhaps, in the effort to cope with the inrush of cases, can only end in

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one way—a medical disaster. As for ships limiting their intake of patients to the establishment of beds, that is also out of the question. There are not nearly enough hospital ships in the first place; neither is it necessary that there should be, as hospital ships are a most expensive, though necessary, method of providing hospital accommodation for a fleet under war conditions. Finally, the confined space of a ship does not afford an ideal place for the continued treatment of wounded such as are received after a naval engagement.

Hence, in the absence of sufficient base hospitals at the point where wounded are landed, or failing casualty clearing stations where cases can be sorted with reference to removal to one or other of the established naval base hospitals, it devolves upon hospital ships to assume the *rôle* of "casualty-clearing-station" pending removal of patients by ambulance train elsewhere.

It is upon the method in which this function is discharged that the success and utility of a hospital ship after a naval action depend. Any hesitation or remissness in "clearing" cases reacts adversely, not only on the ship, but also on the patients. It ends in the ship being unduly congested and consequently "out of action," so to speak, as a "clearing station;" also as a "hospital" she is at once overcrowded and understaffed. Consequently, the best "medical" results are not obtainable under such circumstances.

Finally, when the patients themselves are moved after the lapse of a few days, the process of transport incommodes them more than during the initial period after injury, when the sensitive faculties are somewhat dulled from shock.

With the exception of those cases, which at the outset are obviously unfit for immediate further transport, it practically means that the others should be either discharged to the ambulance train at once after receiving whatever additional medical attention they may require, or they should be retained in the hospital ship until sufficiently recovered for discharge to a convalescent institution. The drawback to the latter procedure requires no further comment. There could not be enough hospital ships to permit of it, neither are the ships themselves suitable for this. It must be borne in mind that hospital ships, even under the most favorable conditions when actually under way to sea, cannot compare with properly equipped shore-hospitals as healing institutions. Whereas, when at rest, swinging round an anchor they are at once a return to the old unhygienic "hulk system." Hospital ships should only be considered as mobile and temporary hospitals.

The cases which should be considered as unfit to travel initially may be classified as follows:

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(*a*) Those in which immediate surgical measures are indicated and for which delayed operation is dangerous.

(*b*) Those in a state of profound shock and collapse from hemorrhage who require absolute rest and constant attention.

(*c*) Those who by nature and the severity of their injury require an additional period of rest after being landed.

The last class is one about which considerable difference of opinion must naturally always arise, but in coming to a conclusion about an individual case, the requirements of the wounded as a whole should not be lost sight of. In other words, by retaining a large number of cases from the point of view entirely of each individual patient, the ship is kept unduly full, and a succeeding batch of cases may perforce be compelled to undertake a railway journey for which they are not in a fit state, owing to lack of accommodation in the ship. This may be an extreme aspect, but it is the duty of a hospital ship to act "collectively" instead of "individually" in the interest of all the wounded. Every wounded survivor of a fleet action should have his chance of recovery.

As yet the number of cases unfit to travel, which are likely to occur, cannot be stated statistically or even estimated with any degree of accuracy further than the statement that they will probably be in the minority. With this type of case the numbers will no doubt be reduced still more as further experience in meeting and handling them is gained.

Shock is a condition giving rise to differing opinions. However, with the exception of the very acute cases previously mentioned, there is no reason to consider it alone a bar to immediate removal by ambulance train. Presumably, morphia will have been given in the majority of cases, and there is no reason why the patient should not make the railway journey under its influence, being kept under it, if necessary, by further doses, and eventually emerge from it comfortably settled down in bed at a base hospital. He is thus located under conditions where any complications can be properly dealt with should they arise. The other aids in treatment of shock can be carried out equally well on the train in transit as elsewhere.

Without unduly laboring the point of "casualty clearing station" and "fitness to travel," a concrete case may be cited in explanation and support. During the recent action off Jutland a man had his right astragalus shattered, leaving a big gap in the ankle. At the time, this case was considered unfit for immediate removal by ambulance train, and was sent forward to a base hospital five or six days later, the journey occupying twenty-four hours. By this time, septic processes had commenced, and the patient on arrival at hospital presented marked signs of septic absorption. During a train journey surgical dressings

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as regards adequacy or frequency are difficult to carry out. Hence the suggestion that cases should be removed to a base hospital as soon as possible after landing, or when convalescent, and not in the intermediate stage when septic complications have developed and require full and continuous surgical attendance, which cannot be given during a train journey. Furthermore, as already mentioned, three or four days after an injury, patients, as a general rule, are more sensitive to the jolting and jarring unavoidable in any form of transport, however well carried out, than in the period immediately consequent upon injury.—*Jour. R. N. M. C.*, October 16.

MEMORANDUM ON TETANUS

THE following notes on the prophylaxis and treatment of tetanus have been compiled with the authority of the British War Office Committee for the study of tetanus, and are to a great extent based on experimental and clinical evidence which has become available since the beginning of the present war.

THE PROPHYLACTIC OR PREVENTIVE TREATMENT OF TETANUS

The prophylactic value of injections of antitetanic serum is beyond all question, but there is strong experimental evidence that in about ten days the immunity conferred by the primary injection is to a great extent lost. It is, therefore, the general opinion that a second subcutaneous injection should be given in all cases of septic wounds, and in order to anticipate the total disappearance of the antitoxin from the body, the second injection should follow the first at an interval of seven days.

In cases of long-continued septic wounds, particularly those caused by shell or bomb, third and fourth injections at seven-day intervals are recommended. It is self-evident that if it is considered necessary to give a second injection, then it is equally necessary to give a third or fourth or more prophylactic injections, as the passive immunity conferred by the antitetanic serum is of short duration.

It may be definitely stated here that the danger of anaphylactic shock is negligible when prophylactic doses of 500 U. S. A. units contained in 3 c.c. of horse serum are given subcutaneously, whatever the interval after the preceding injection.

Dosage in prophylactic or preventive treatment of tetanus.—The primary injection should consists of 500 U. S. A. units, and the second and following injections should be, for the present, of the same amount. The primary injection is given as a rule at a dressing station or field ambulance, as soon as the wounded soldier is removed from the firing

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line. The second and following injections will most frequently be given at home hospitals. The ordinary phial usually contains 1,500 units of tetanus antitoxin. One-third of a phial should, therefore, be injected into each wounded man. There is no necessity to sterilize the syringe after each injection; the serum is aseptic and, moreover, contains an antiseptic; it will be sufficient if a freshly sterilized needle is used for each case.

Precautions to be taken before operating on wounds.—When operations are performed at the site of wounds, even if they are healed, a prophylactic injection of serum should invariably be given if the operation be performed at a greater interval than seven days from the last injection. Cases have occurred in which the performance of simple operations has been followed by an attack of tetanus, although in many cases the primary wound had been healed several weeks before the operation. This precautionary injection may consist of a single subcutaneous injection of the ordinary prophylactic dose of 500 units, given when possible two days before the operation. It is better to give it two days before the operation, as it takes some forty-eight hours for antitoxin to be fully absorbed after subcutaneous injection. Injected intramuscularly the absorption is quicker—said to be about twelve hours—so that this method could be used if time were pressing. Of course, a larger dose than 500 units may be injected if thought advisable.

Antiseptics which may be of use in the preventive treatment of tetanus.—The group of oxidizing antiseptics, such as hydrogen peroxide, potassium permanganate, chlorine water, and solution of iodine, are particularly unfavorable to the anerobic growth of the tetanus bacillus. They have the power of rendering toxin nontoxic.

DIAGNOSIS

The classical symptoms of tetanus as described in the majority of the text-books refer to a phase of the disease when treatment has already lost much of its value. With many medical men, tetanus is not tetanus until the symptoms of risus sardonicus and lockjaw are present. In those who have been protected by prophylactic injection of antitoxin, trismus and general symptoms practically never occur, and the manifestations of tetanus are confined to local spastic rigidity of the wounded limb, which may persist for weeks.

The early diagnosis of tetanus is of the greatest importance. All clinical and experimental evidence tends to show that the chances of successful treatment diminish rapidly with the length of time after the first symptoms are observed. Tetanus toxin reaches the motor nerve

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cells by traveling up the nerves. It is not directly conveyed to the central nervous system by the blood. In a large number of cases the toxin appears to reach the spinal cord primarily by the nerves which are in connection with the seat of the injury, and hence the motor nerve cells governing the muscles round about the wound will be the earliest affected, such affection showing itself in the form of spasticity and increased reflex excitability of the muscles near the wound. In some cases these symptoms may precede other symptoms of tetanus by many hours. It is therefore desirable that the muscles in the vicinity of the wound should be examined whenever dressings are removed, and the occurrence of rigidity or twitchings or local increased reflex response to gentle tapping or pressure immediately reported to the surgeon in charge.

All nursing sisters engaged in dressing wounds should be warned to give the alarm if the muscles round the wound are harder or more rigid than the muscles of the uninjured limb or side. Other early symptoms of diagnostic importance may be anxious look, pain in back or neck, sore throat, general restlessness, unreasonable outbursts of temper, insomnia, violent headache, excessive yawning, complaints of spasm or stiffness in injured limb, stiff neck or difficulty in swallowing without recognizable cause, stitch in side, profuse local or general sweats, and difficulty in micturition.

It is very desirable to obtain the coöperation of medical officers in the endeavor of the committee to formulate the early symptomatology of this disease, and to confirm or add to the above. Any brief account of early symptoms noted both in the major and in the minor forms of the disease will be of great value, and officers are requested to forward any such observations to Surg. Gen. Sir David Bruce, chairman of the Tetanus Committee, at the Royal Army Medical College, Grosvenor Road, London, S.W.

THERAPEUTIC OR CURATIVE TREATMENT OF TETANUS

It cannot be too strongly emphasized that time is the all-important element in the treatment of tetanus. As short a time as possible should be allowed to elapse between the diagnosis and the commencement of active treatment. A delay of an hour may make all the difference between success and failure. It is on this account that the early symptoms are of the greatest importance. In almost every case of tetanus there are found local manifestations of the disease, very often hardness and rigidity of the muscles round the wound, and these signs can be seen or felt for days or even weeks before the occurrence of trismus. In a case on record, these local symptoms had been present for three weeks before the trismus showed itself and before tetanus

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was suspected. One medical officer is reported to have said that symptoms of tetanus were present in a case, but were not sufficiently severe to justify the use of antitoxin. According to present ideas it should no longer be permissible to wait for the occurrence of lock-jaw before pronouncing the word tetanus; 5,000 units of antitoxic serum are of more avail at the very beginning, when the disease is still localized than 50,000 when the symptoms have become general. The moment, then, any local manifestation of tetanus is observed it is recommended to proceed at once to vigorous specific treatment.

The treatment of tetanus may be divided into specific and symptomatic:

1. *Specific.*—Specific treatment consists in the giving of tetanus antitoxin, which has the power of rendering the tetanus toxin with which it comes in contact nonpoisonous. From what has been said above about the injurious effect of delay it is obvious that it is necessary to give antitoxin by the method which enables it to produce its effect most quickly. Subcutaneous injections of serum are absorbed very slowly, forty-eight hours may elapse before a dose is fully absorbed; hence, little can be expected from this method at the beginning of treatment.

Experimental and clinical evidence has shown that the best results are obtained by intrathecal injections of serum.[1] This direct attack on the toxin in the neighborhood of the central nervous system should be supplemented by intramuscular injections in order to neutralize any toxin in the blood, and thus prevent any more of it being taken up by the nerve-endings in muscle. Absorption of antitoxin from muscle is rapid, reaching its maximum in about twelve hours. In addition to the intramuscular method, subcutaneous injection can be practiced at any time, and is particularly useful in the later stages in keeping up the antitoxic quality of the blood. Absorption reaches a maximum in two or three days. It is recommended that intravenous injections should not be made, as the risks of anaphylactic trouble occurring, are greater when serum is given intravenously than when it is given by any other route.

Dosage in the therapeutic or curative treatment of tetanus.—When given curatively antitoxic serum must be administered in very large doses. In a case of tetanus the first thing to do is to give an intrathecal injection of antitoxin.

The amount of cerebro-spinal fluid which can be withdrawn will, as a rule, not be more than 20 c.c. It is usually held to be undesirable to

[1] A description of the method of performing an intrathecal injection is given as an appendix on page 119.

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run in more serum than will replace the cerebrospinal fluid drawn off, and in the cases when little or no fluid can be withdrawn it is not wise to inject more than 20 c.c. of serum *and this very very slowly.*

If the serum used be of the ordinary strength of 150 units in 1 c.c., the patient will then receive a dose of some 3,000 in 20 c.c. If the serum be of higher potency, say 800 units to the cubic centimeter, the patient will then have received 16,000 units. For intrathecal injections this high potency serum, if procurable, should by all means be used. At the same time 5,000 to 10,000 units shall be injected intramuscularly, and 3,000 to 5,000 may also be given subcutaneously. The intrathecal injections may be repeated daily for three to five days, when they should, as a rule, be discontinued. The intramuscular and subcutaneous injections may be continued daily or oftener, according to the severity of the symptoms. When the disease shows distinct signs of abating the size of the dose may be gradually decreased, the interval between the doses lengthened, and the serum given only subcutaneously.

The following may be given as an example of the serum treatment which has been successfully employed in early, but well-marked tetanus:

Day	*Subcutaneous*	*Intramuscular*	*Intrathecal*
1st day	.....	8,000	16,000
2d day	.....	8,000	16,000
3d day	.....	4,000	8,000
4th day	.....	4,000	8,000
5th day	2,000	.....	.....
7th day	2,000	.....	.....
9th day	2,000	.....	.....

2. *Symptomatic.*—Symptomatic treatment consists in the exhibition of sedative drugs. Perhaps the most suitable is morphia in ¼-grain doses and administered every four hours; potassium bromide, chloral, chloretone, paraldehyde, are also given by the mouth or rectum. Carbolic acid: There is no convincing evidence that the carbolic acid treatment of tetanus has any curative effect whatever, or any action upon the course of the disease. Magnesium sulphate: Treatment by sulphate of magnesium has no effect upon the disease itself. The cessation of spasm which follows an injection is only temporary, and is purchased at the cost of risks which are far from negligible. It is very doubtful if any real advantage is gained by its use.

Surgical treatment of the wound.—There is a general impression that it is of advantage to excise the wound, or amputate the limb in cases of tetanus. The matter is one upon which there is considerable differ-

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ence of opinion. From the clinical experience of many observers it would seem that these procedures are of little avail and may actually accelerate the course of the disease. Animal experiment, as far as it goes, also suggests that operative measures are useless. While more evidence is required before any dogmatic statement can be made, it appears safer to abstain from surgical interference with the wound until the ordinary treatment for tetanus has been carried out, unless there exist other and imperative reasons for immediate operation. The irrigation of the wound with oxidizing agents, such as hydrogen peroxide, when this can be done without undue disturbance and without opening up the wound, is to be recommended.

Reporting and care of cases.—In every command one or more officers with special knowledge should be detailed by the D. D. M. S. to visit and assist in treatment of cases of tetanus. These officers should be at the general hospitals of the district, and their names and telephonic addresses should be communicated to the officers and medical practitioners in charge of subsidiary and V. A. D. hospitals. On occurrence of a case of tetanus the appointed officer will be immediately informed, and he will at once proceed to visit the case and offer assistance in the carrying out of such treatment as has been suggested in the present memorandum. He will, if necessary, assist in the operation of lumbar puncture and intrathecal injection. This will seldom be necessary, as from what has already been said as to the danger of even an hour's delay, this intrathecal injection will usually have been done before his arrival, unless the distance to be traveled is short. He will make careful inquiry into the case in order to ascertain if any early symptoms had been present and had escaped notice. He will note what prophylactic injections have been made, and if omitted, why they were omitted. When visiting the hospital where the case has occurred he will ascertain if the other wounded men are receiving prophylactic injections. He should see that sufficient notes of the case are being kept in order that the tetanus form can be filled up as fully as possible. For example, it is very seldom that the distinguishing marks on the bottles of serum are reported. If serum trouble arises it is evident that this information would be useful. He will forward an inspector's report to Surg. Gen. Sir David Bruce, with as little delay as possible. The ordinary tetanus report will be filled in by the medical officer in charge of the case.

Officers in charge of hospitals will be responsible for the administration of the second and following prophylactic doses of antitoxin to all wounded under their care, unless reasons exist for withholding them. The administration of antitoxin will be recorded on the case sheet. They will also, as heretofore, inform Surg. Gen. Sir David Bruce, by

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telegram, of the occurrence of a case of tetanus, and on the death or recovery of the case forward the usual tetanus report in accordance with war office instructions. Any abnormalities of behavior of antitetanic serum should be carefully noted and reported.

As the tetanus committee was appointed for the purpose of studying tetanus, it is greatly to be desired that every medical officer will coöperate in a collective investigation, and submit any evidence in his possession which may add to our knowledge of the disease and its treatment.

APPENDIX

The method of performing an intrathecal injection.—The patient should preferably be under general anesthesia, but the operation can be performed with local anesthesia. The skin over the area of the fourth and fifth lumbar spines should be painted with iodine or cleansed with soap and water followed by an antiseptic. A spinal needle and 20-c.c. syringe should be boiled in normal saline, and the surgeon must observe throughout the most rigorous aseptic precautions. The patient is bent head to knees, so as to present as fully a curved back to the operator as possible, and the position of the fourth lumbar spine ascertained by drawing an imaginary line between the crests of the ilia. The tip of the finger is placed on the supraspinous ligament connecting the summits of the spinous processes of the fourth and fifth lumbar vertebrae. The needle is inserted about three-eighths of an inch to one side of the middle line, and directed forwards and slightly upwards and inwards. If the needle strikes the bone it should be withdrawn and a fresh attempt made. The canal is reached at a depth on an average of about 2½ inches. The trocar is withdrawn and about 20 c.c. of cerebro-spinal fiuid allowed to flow out into a measured vessel. The syringe is then fitted to the needle and the serum injected. It is important that the serum be heated to the temperature of the body and the injection made very slowly. The canal can also be reached by pushing the needle through the supraspinous ligament in the middle line half-way between the two spinous processes. If several injections have to be made it is well to choose fresh sites. Blocking of the flow of the cerebrospinal fiuid by a blood clot may be overcome by reinserting and withdrawing the trocar. The bed should be tilted at the foot and the pillow removed for an hour or two after the injections.—*The Lancet*, November 18, 1916.

TO OUR MEMBERS

THE MILITARY SURGEON would be glad to have members suggest subjects for the Wellcome prizes, 1917.

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Obituaries

First Lieut. Arthur L. Hunt, M. R. C., U. S. Army, a member of the Association of Military Surgeons, died in Washington, D. C., October 8, 1916. Lieut. Hunt was born in Lewiston, Me., in 1877 and took his degree in Arts at Bowdoin College and in medicine at the George Washington University in 1905. Dr. Hunt, for some time before a resident of Washington, D. C., took up private practice in that city, and also was appointed Medical Inspector in the Contagious Disease Service of the Municipal Health Department.

During last summer he was much occupied in the protection of the city from an incursion of infantile paralysis, which threatened from all sides, his particular duty being to keep under observation persons coming from infected communities.

He was taken ill September 29 with poliomyelitis, nearly two months after personal contact with an actual case of the disease and, presumably, was infected by a "carrier." The attack was typical, progressed to almost total paralysis and final dissolution, at the age of 39 years.

Dr. Hunt, in the very prime of a useful life, died doing his duty, protecting the community from attack, quite as serious in its possible consequences as a battle. A modest hero of whom it may be said, "Greater love hath no man than this, that a man lay down his life for his friends."

First Lieut. Gilman Corson Dolley, M. R. C., U. S. Army, a member of our Association, died in Manila, P. I., October 21, 1916, from pneumonia. Dr. Dolley was born in 1880 and received his doctor's degree from the Medico-Chirurgical College of Philadelphia with the Class of 1907. After a term of teaching in the bacteriological laboratory of his Alma Mater, he accepted a commission in the Medical Reserve Corps and was assigned to active duty at Fort Leavenworth, Kans. Later he was appointed bacteriologist in the Tuberculosis Sanatorium of Pennsylvania, where he remained but a short time. Thereafter he went to Santo Domingo, and during the last year of his life was on duty in the Philippine Islands as Resident Physician at the Leprosarium, Palawan.

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Col. Henry S. T. Harris, M. C., U. S. Army, Department Surgeon, Western Department, died suddenly at San Francisco, Cal., December 17, 1916, of double pneumonia. Col. Harris, a long-time member of the Association, was born at Charlottesville, Va., November 25, 1863. He received the degree of A.M. from Columbian (George Washington) University, Washington, D. C., in 1883, and the following year the doctorate, from the same institution. Dr. Harris was appointed Acting Assistant Surgeon, June 24, 1885, was commissioned an Assistant Surgeon in the United States Army, January 5, 1886, with the rank of First Lieutenant, and was advanced to the rank of Captain in 1891. During the Spanish-American War he was appointed Major, Brigade Surgeon, U. S. Volunteers—which office he held until February 4, 1901, when he was promoted Surgeon, with the rank of Major in the regular establishment. February 29, 1909, he was promoted to Lieutenant Colonel, and on May 23, 1916, was made Colonel, Medical Corps, the youngest officer of his rank in the Corps.

Col. Harris was Surgeon of the Ninth Cavalry in the Santiago Campaign and participated in the various encounters in which that regiment was engaged. Later he was assigned to duty in the Philippines and, with Gen. Funston, took part in the capture of Aguinaldo. He was highly commended in several instances for his bravery and faithfulness to duty while in the field. Gifted with a brilliant mind and attractive personality, Col. Harris had a large circle of friends who will miss his genial companionship.

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PUBLISHED BY THE
ASSOCIATION OF MILITARY SURGEONS
OF THE UNITED STATES
ARMY MEDICAL MUSEUM, WASHINGTON, D. C.

FEBRUARY, 1917

VOL. XL NUMBER 2

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The Military Surgeon

Published monthly and constituting two volumes annually.
Volumes commence with the January and July numbers.

Entered as second-class matter January 22, 1916, in the Postoffice at Washington, D. C., under the Act of March 3, 1879.

Subscriptions $3.50 a year for the United States. Elsewhere throughout the world, $4.00. Single copies 40 cents. Subscriptions payable in advance. Checks should be made payable to the Association of Military Surgeons and not to any officer personally.

The addresses of members and subscribers are not changed except upon request. In every case the old as well as the new address should be given. Requests for change of address must reach the Secretary before the twentieth of the month to be effective for the following issue.

Original articles, items of news and matter of interest to the Services are welcomed. Requests for reprints should be made at the time of forwarding articles.

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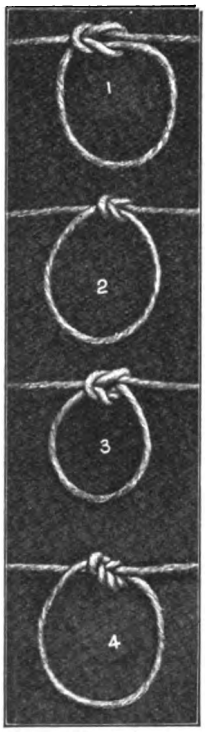

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ORIGINAL ARTICLES

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THE MOST PRACTICABLE PLAN FOR THE ORGANIZATION, TRAINING AND UTILIZATION OF THE MEDICAL OFFICERS OF THE MEDICAL RESERVE CORPS OF THE UNITED STATES ARMY AND NAVY AND OF THE MEDICAL OFFICERS OF THE OFFICERS' RESERVE CORPS OF THE UNITED STATES ARMY, IN PEACE AND WAR.

THE WELLCOME FIRST PRIZE ESSAY, 1916

BY CAPTAIN MAHLON ASHFORD
Medical Corps, United States Army

INTRODUCTION

THE best plan for the organization, training and utilization of the medical officers of the Medical Reserve Corps of the U. S. Army and Navy, and of the medical officers of the Officers' Reserve Corps of the U. S. Army in peace and war, must be practicable, comprehensive, progressive and sufficiently farsighted to be capable of acceptance as a military policy. It should furthermore present a project which may be considered to offer new and useful ideas in solving this intricate problem. The most practicable plan is not necessarily the simplest or most easily consummated plan, nor even the most readily workable plan in time of peace. Clearly the most practicable must be one which is practicable of execution in time of peace and adequate for national need in time of war. All plans for adequate military preparedness in America are hindered, not advanced, by restrictions based upon theoretical considerations concerning the willingness of the American people to make sacrifices on the altar of National Protection. Every plan for military preparedness in the United States is immediately attacked from this viewpoint of feasibility. "Will the American people stand for it?" This is the first question asked. The answer is always, "No."

The belief of the theorists is that the people of the United States will not stand for anything involving personal sacrifice or pecuniary loss to themselves. In this I do not agree. On the contrary it is clearly shown by the events of the past two years, that the people need only to be shown a necessity for military preparedness, when they themselves will demand this.

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It becomes necessary then in the first place, to determine upon some method of reaching all reputable doctors, arousing their interest and ultimately gaining their attention. This secured, our success in advancing another step rests with the virtue of our cause and the energy and skill with which we advocate it. I mean to say it behooves us to show cause or necessity for the medical profession of America, to devote precious hours to preparation for the duties of a military surgeon. Manifestly, the organization, training and utilization of any great percentage of American doctors must be secondary to the foregoing problems.

It will be seen hereafter that the plan herein proposed will, when adopted, automatically perform the arduous tasks proposed in the preceding paragraph. It is a great task to gain the attention of the vast and diverse audience composed of American physicians; an even greater one to convince them of any general necessity for a military education or military service of any character for American doctors in time of peace. My plan does not endorse any scheme whereby so great an amount of missionary work must be performed, before effective training can be commenced for any generation of American doctors, other than the present one. For our own times, we must endeavor to win the consideration of our fellow-practitioners in civil life by the means at hand. These are briefly: the Medical Press, the Lay Press, Public Lectures, Personal affiliations.

The medical press is the most powerful factor in influencing the sentiment of medical men, and has by far the largest and best audiences. Most fortunately it is patriotic and therefore friendly to our best endeavors. The Medical Press will customarily give publicity to presentable articles upon medico-military subjects. In these matters it has always evinced breadth of vision and patriotic principles. We should therefore utilize to the fullest degree, this opportunity to foster community of interest between civil and military medical men, and further, seek through this channel to present our arguments to the medical profession. The lay press is, next to the press of our own cult, the means whereby we may reach our profession. Moreover, we can, through the lay press, mold public sentiment, which is a most powerful lever in any great movement. It is wise, therefore, to obtain an audience of the people and to show them the picture of the avoidable sufferings of a warring nation, whose doctors are unversed in the military phase of their profession. The same influence may be exercised on a lesser scale by public addresses, and by personal associations, especially with the great and magnetic leaders of the profession. I will instance the example and influence of the late Dr. Rodman, and in so doing I beg you to note that

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Dr. Rodman, who rose to the highest pinnacle of his profession through many years of practice in civil life, had implanted in his heart, in his earliest professional years, the seed which years later induced him to present himself to the medical profession of America, as an advocate of training of doctors in civil life for the duties of the military surgeon.

From the foregoing sentences, it will be seen that I regard any rational plan for national defense as necessarily comprehensive—in short, to embrace all classes of citizens. It is true that the medical profession of America includes men of the most varied types, engaged in diverse lines of research and practice of their profession; but it is equally true that the medical department of a great army and navy requires the services of men of the most varied talents and achievements. A rational scheme of national defense must include all of these types, and furthermore, discern their especial talents, so that the volunteer officer may with least loss of efficiency fit into some cog of national need.

Plans for national defense cannot be confined to equipping an army and navy for conflict with a secondary, or ill-prepared, adversary. They must consider that any vital issue between the United States and a first-rate world power will compel this nation to equip an army and navy of a magnitude unprecedented in the history of this continent and measured in millions, not thousands, of fighting men. In an article on the "War Doctors," in the *London Times*, Lord Northcliffe says, "The medical army of today (British) exceeds numerically the whole British military forces overseas before the outbreak of war."

"It is a tribute to our medical authorities that all this vast scheme had been arranged before the war."

An army of 500,000 men for an offensive campaign against a nearby lesser nation, might possibly be provided with medical officers by utilization of the Medical Department of the Regular Army, when it has reached the complete expansion provided by the National Defense Act of 1916; plus the Medical Department organizations of the National Guard; plus the service of the entire Medical Reserve Corps; plus the services of perhaps 2,000 additional volunteer medical officers. To increase this army by an additional 500,000 combatants would require the services of 3,500 additional medical officers. To raise an army of 5,000,000 men would require the services of 35,000 medical officers. But it should be observed that, with the first 500,000 troops, march the entire trained medical personnel of the nation. Stretched to the utmost, they cannot supply personnel to a greater body of men. Moreover, it must be remembered that the Navy must, in time of a great war, turn to the country for medical officers with equal need as the Army. Thereafter will devolve upon the civilian physician all duties, civil and military,

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of the military surgeon. Sir A. Keogh, Director General of the British Army, says, in speaking of the expansion of the British medical service in this war, "The burden of responsibility thus placed upon the medical profession could not have been assumed but for the preparation made in peace, for the nucleus of trained officers in so large an army medical corps as the country now possesses would have been too small had the old conditions prevailed. As it was, the country was able to take the field with a larger number of experts in administration than it had ever before possessed, but this meant that owing to the magnitude the war so quickly assumed, nearly all the regular officers of the Medical Corps were required to give their attention and their energies to administration, leaving to specially selected experts the technical work which the care of the sick and wounded required. Hence the appointment of consulting surgeons by whom all subsequent surgical development can be determined. The internal organization of the medical units; the formation of the cadres for the battalions; the establishment of hospitals at home and the formation of these for abroad; the provision of doctors, nurses, drugs, instruments, dressings; the equipment of ships and trains; and the innumerable details associated with work of this kind, need only to be mentioned to be understood as offering opportunities for errors and omissions of far-reaching importance. But if to these is added the mass of work connected with the supervision of recruiting for the new armies, their housing, and the sanitation of camps and barracks, some idea will be gained of the scope and relation of medicine to the art of war, and the part played by medical men will be realized."

A great many physicians conscientiously believe that, in time of maximum need, the medical profession can readily furnish the required service. This is unquestionably true, but with this proviso: It requires time to make an efficient military surgeon from a civil practitioner.

It is common practice for Americans of all classes to revert to former national conflicts for exemplification of the adaptability of peaceful Americans to conditions of war. Alas! How little we know of the intimate history of those struggles, in which our shortcomings were appalling, and our ultimate salvation was miraculous. In his report for the year 1817, Surg. Gen. Lovell, speaking as Surgeon of the 9th Infantry in the War of 1812, and later experience as Surgeon General, makes the following statement in reference to medical sanitation: "This is one of the most important duties of the medical staff, is most carefully attended to in other services, and can only be introduced into ours by long practice. Like many minute duties of the line, particularly those connected with police and the interior economy of a camp, they are only to be gradually acquired and so incorporated into the regu-

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lar routine of duty as to be considered as indispensable as the mere prescription of medicine. An officer of the line may soon learn the duties of the field, and a surgeon be amply qualified for his profession, and both of them worse than useless to an army. It is from knowledge of minutiae which depend neither on general regulations nor specific orders that the experienced officer and surgeon becomes so much superior to the undisciplined recruit. It is almost entirely in order to acquire this kind of knowledge that a military establishment is kept up in time of peace, and it is an undoubted fact that in no department of the Army is it so slowly acquired and therefore so deficient as the medical. How severely this was felt during a great part of the last war is too well and too publicly known to need comment. . . .

"For there can be little doubt that, where one man has died from improper medical treatment, ten have been destroyed from want of a knowledge of the many duties peculiar to an army surgeon."

Thus early in our military history and prior to the present high degree of development of the special requirements of the army surgeon was the fact of such requirements so clearly stated by a Surgeon General who had gained his experience in war (War of 1812).

The American nation has passed through one war of magnitude. In the war between the States, we must not deceive ourselves as to the character of our adversary. The Confederacy was a new and hastily organized government. Her entire military system was the product of a few days' work. Its organization was in many respects a copy of our own; its personnel, like our own, a body of untrained or ill-trained volunteers; its matériel, any military equipment of any age or vintage which it could beg, borrow or steal.

Both combatants were totally unprepared for war, and, consequently, neither obtained a decisive advantage in the first six months of the war. Such advantage as there was in the first serious engagement lay with the newly organized Confederacy. Had the victorious army of the South pushed its advantage after Bull Run, the history of the "Lost Cause" might have been materially changed. The advance was, however, withheld not altogether for military reasons, but for political ones, which would never have restrained a foreign foe. After this disaster, the Union settled down to organize and train its armies. Would such opportunity ever be given us in conflict with a powerful foe? The past two years of world war have given us all too vivid a course in the First Reader of War to remain longer oblivious to the conduct to be expected from a powerful foe.

We have, however, taken this one great conflict for reference. Let us see how the Medical Department fared in the beginning of the Civil War.

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At the outbreak of the Civil War, the United States Army consisted of 1,117 officers and 11,907 enlisted men, a total of 13,024.

The Medical Department consisted of 1 Surgeon General, rank of colonel; 30 surgeons, rank of major; 84 assistant surgeons, rank of captains or lieutenants. This gave a total of 115 medical officers. This, it may be noted in passing, was an average of about 10 medical officers to each 1,000 enlisted men, a much higher ratio than the 7 per 1,000 for which the present Medical Department has made such an uphill fight. Yet how totally inadequate the number of trained medical officers was for the needs of the great army of volunteers. As a matter of accuracy, however, it must be stated that about 25 per cent of these medical officers resigned at once, either to enter the Confederate service or to remain inactive. The number of these medical officers who thus terminated service was 27, thus leaving the U. S. Army a total of 88 regular medical officers. In addition to this personnel, each regiment of State volunteers was mustered in with one surgeon, with rank of major, and one assistant surgeon of junior rank.

In July, 1861, Congress authorized the appointment of Brigade Surgeons of Volunteers of the rank of major. In April, 1862, Congress reorganized the Medical Department. The Surgeon General was given rank of brigadier general; an assistant Surgeon General was given rank of colonel of cavalry; a General Medical Inspector was given rank of colonel of cavalry; and eight medical inspectors were given rank of lieutenant colonel of cavalry; and medical purveyor and medical cadets were authorized and their duties prescribed. It is to be noted with reference to the present plan that these medical cadets were generally medical students and were made dressers, operating assistants and similar semi-professional men.

By the end of the war, the Medical Department consisted of 1 surgeon general, 1 assistant surgeon general, 1 medical inspector general, 16 medical inspectors and 175 surgeons and assistant surgeons. There were also 547 surgeons and assistant surgeons of volunteers; 2,109 State regimental surgeons and 3,882 assistant regimental surgeons of State regiments. Finally there were 85 acting staff surgeons; 5,532 acting assistant surgeons; and a large number of medical cadets.

Considering this latter class, the medical cadets, as a noncommissioned force, the grant total of medical officers in the Union Army in 1865 totals 12,349. Thus the Medical Department of the U. S. Army expanded in this war from 88 members to 12,349, an increase of more than 14,000 per cent. In addition the Medical Department had organized a corps of medical purveyors and cadets, a vast body of hospital

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corps men, a large number of field hospitals and ambulance companies, great numbers of base and general hospitals, and a highly efficient system of rendering aid and removing wounded from the battle line.

Does my reader think that this metaphorphosis, undertaken and carried out in the hurly-burly of a great war, was completed without the lapse of much time, without costly errors, without untold numbers of preventable deaths among the nation's wounded, without sufferings and agony by American soldiers dreadful to contemplate and which would have been prevented by a medical department whose personnel was experienced and well organized at the beginning of the conflict?

When you read the account of the Medical Department at the first Bull Run you do not find cowardice, or lack of medical or surgical knowledge, displayed by the doctors suddenly snatched from civil life to the career of military surgeons, but you do find lack of a certain training—training which, had it been the most elementary form of that which we now style sanitary tactics, would have saved lives and spared suffering. Multiply the experience of that day by 100 succeeding engagements. Gradually you approach an organized Medical Department—a Medical Department such as we should have for our soldiers at the beginning, not the end, of a great war.

This you may think ancient history. Then let us pass on to our own times. Here is a phrase taken from a current editorial of the *New York Medical Record*. It is the only comment I shall make on the Medical Department of the Spanish War of 1898: "The Spanish-American War probably did more to wake up the profession to the realization of its responsibility to the country in the matter of military medicine than any other event. It is a matter of history now, and history does not make pleasant repetition, how the few trained military surgeons were overwhelmed by an avalanche of civilian physicians ignorant of tactics, transportation, administration; in fact every branch of military medicine."

I have said enough. Two truths stand forth beyond dispute: Modern wars employ vast armies and navies; these require in turn an army of specially trained doctors.

TRAINING OF THE MEDICAL RESERVE CORPS

For the present discussion, I shall first devote myself to the subject of training, and pass later to the organization and utilization of the Medical Reserve Corps of the Army and Navy.

I may as well say in the beginning that my plans are based upon a conception of a reserve which shall hereafter be a feature of American life, and which shall embrace the great majority of reputable medical

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men. My reasons for this comprehensive viewpoint are expressed elsewhere in this paper. In all of the following discussion, reference to the Medical Reserve Corps is intended to designate the present corps or the Officers' Reserve Corps as contemplated under the National Defense Act of 1916.

The training of the Medical Reserve Corps for Army and Navy will, under the plan here outlined, differ from any plans now in operation in that it is based upon the principle that all matriculates in reputable medical schools shall be considered by the Government as potential Medical Reserve Officers, and shall be there given opportunity, at least to begin their preparation for a commission in the Medical Reserve Corps of the Army or Navy or Organized Militia.

In advance of national acceptance of the doctrine of universal military service, it is not here proposed to compel medical students to pursue a course of instruction along military lines. That is at present impracticable. It is proposed however that the United States Government make offers to reputable medical schools somewhat analogous to the offer priorly in force or recently incorporated in the National Defense Act of 1916, whereby all reputable schools and colleges are encouraged to have military training for their student body.

It is specifically proposed that the Government make for the present an optional offer to all medical schools recognized as reputable by the American Medical Association. This offer is to be a choice of compulsory or optional course in sanitary tactics for their student body. Under this offer any medical schools which so elect may establish a course in sanitary tactics for their student body under the direct patronage of the Government. The faculty of the individual school shall itself elect whether this course is compulsory for attainment of a medical degree or purely an optional one. If the medical school shall elect to make this course a prerequisite for the award of a diploma, the Government will put this school in Class 1. If the medical school shall elect to make this course optional, the Government will place this school in a Class 2.

Medical schools of Class 1 shall have an instructor detailed by the War Department who shall conduct the instruction and examination of the students in this branch. This instructor may be an officer of the Medical Department of the Army or Navy, active or retired, who has been selected by the faculty with approval of the War or Navy Department, or he may be a member of the medical school faculty, regularly elected in the usual manner. If of the latter class, however, he must be a qualified member of the Medical Reserve Corps in good standing in his own service.

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Medical schools of Class 2 shall have precisely the same arrangement provided the number of volunteer students is sufficient to warrant the detail of a medical officer. Otherwise the instruction will be denied schools of this class. A sufficient number of students in this course shall be such as may be prescribed by the Secretary of the War or Navy Department concerned. The plan presupposes at least 100 bona fide students for each instructor.

The medical officer who is an authorized instructor, if on the active list of the Army or Navy, will be compensated by the Government as if on any other duty; if on the retired list, he will be given the full active pay of his grade; if on the Medical Reserve List, he will be given the pay and emoluments of the grade of a First Lieutenant of the Army or of an Assistant Surgeon in the Navy.

In this manner the officer will be fully compensated, the medical school will not be embarrassed by the expense of an additional chair, and the Government will be well rewarded for the benefits derived in the early and systematic inculcation of military instruction of the medical men of the nation. The Government will also derive the additional advantage of having a representative in medical centers, who will be useful in many ways as a link between civil and military practitioners.

The question at once arises: Shall the instruction be the same for the Army and Navy, and, if not, who shall determine what course shall be pursued by the student? The student must himself elect which course he shall pursue, and the instruction will be different for each course and given by a representative of the service concerned. This appears to be the most practicable plan. It is manifest that neither service would be satisfied to have the field left exclusively to the other service. In cases where the medical students who desire instruction for one service are insufficient in number to warrant that service in supplying an instructor, the Surgeon General of the service concerned may request that the Surgeon General of the sister service incorporate the instruction of these students with that of its own students. In such instances, the instructor will be advised by his own chief to avoid any efforts of coercion or proselytism among these individuals.

Having stated in principle my plan of undergraduate or student training for offices of the Medical Reserve Corps of both services, I shall now pause to give my reasons for departure from the system now in operation.

Clearly the most advantageous point in a medical man's career for a course of instruction, which shall render him more serviceable to the nation in time of war, is the formative period when he is receiving his medical education.

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Where does a government begin the public education of an undeveloped colony? With the children, of course, you will say. And why? Are children more important than the men and women of a country? They are. More important because they are the future; the men and women are the present, fast merging into the past. More important because they are as yet unformed, and may be moulded. The young are ductible, their minds are as fresh soil in which seed sown rapidly gives the greatest crop, and, finally, they are always available, without hindrance of other more imperative daily duties. The situation is analogous with reference to training men for the Medical Reserve Corps, for this vast field of citizen training in military matters is like a newly acquired colony, an untilled soil. Certainly we should and must train the doctors at present in the active field of their profession. We need their brains, their highly developed technical skill, their interest and encouragement. They who are now the giants may be called to help us, while the youngsters are still at the threshold of their professional career. But our plans, to be worthy of consideration, must be more far-seeing than the present exigency.

The proper place, then, I reaffirm, to commence the instruction of medical men for military emergencies is the medical school. Here we can reach every potential doctor, not an occasional one as under the present system. The students are chiefly young men whose sympathies may be enlisted more readily, and whose ideals are untarnished by rubbing too much of the world's ways. These students are in a receptive state. They go to medical school to acquire knowledge and the majority are rapacious for knowledge. Brief consideration by my reader will convince him far better than can I that the ideal person to receive this instruction is the student of medicine rather than the practicing physician. Moreover, the medical practitioner who considers my plan will endorse my statement that the period of medical student life is the one time when the physician can interest himself in acquiring military essentials with least personal and professional sacrifice.

When the average medical student leaves the schools, he passes to hospital interneship. No one who has passed through a period of interneship in a busy hospital will for one moment assert that the hospital period gives opportunity for other pursuits. Even were it possible to divert the interne from his daily work, it would work as a hardship to him, for this is his period of intensive training. The hospital period is not then a practicable period for initiating instruction for Medical Reserve officers.

From interneship, the average doctor enters upon active practice of his profession, or, to be more accurate, he presents himself to the public

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as a candidate for the bestowal of its confidence. This is oftimes a period of considerable leisure for the young physician. It might seem to be an ideal time for the purposes of the Government in giving military training for Reserve Medical officers. It is an ideal time for the continuation of such activities and should properly be so considered, but it is not the best period for beginning this instruction. The young practitioner often has much leisure, it is true, but, if that leisure is spent in any other pursuit than nursing his new-born practice, he has little prospect of rapidly advancing his standing. Especially is it difficult for him to leave his practice for practical field instruction in military matters for any but the briefest period.

As the doctor advances in his professional career, the claims upon his time become more pressing, in direct ratio to his success and skill. The average physician is willing to give his country service, but he has the barest leisure for theoretical and practical instruction.

If the physician has in his student days received a brief but comprehensive basic training in academic and practical work of a Reserve Medical officer, he may thereafter, with the minimum of time and study, remain sufficiently in touch with the Medical Department administration to be of maximum service to the nation in case of war.

But this, you will say, verges towards a scheme of universal military service, since it proposes a scheme for universal instruction in military matters for all medical students. Precisely so. The present military policy by which we endeavor to have military preparedness by brief summer camps, by officers' Reserve Corps, as yet scarcely organized; by every device even to Baden-Powell's Boy Scouts, whereby we may delude ourselves that we are getting something for nothing, is of course well known in our inner heart to be a purely makeshift policy.

The plan recently adopted in our National Defense Act of 1916 for an Officers' Reserve Corps proposes to utilize the services of the leading business and professional men for the benefit of the nation in time of hostilities, principally in the fields of organized industry. This Officers' Reserve Corps concerns us directly because it has one section for the medical profession. It is an excellent plan so far as it goes, but it is in the last analysis a makeshift, because it sidesteps the inevitable fact that the only true preparedness must be based upon universal service. No other means can be devised for adequate military protection of this republic. No other means will be equitable and worthy of a democracy. No other means will act with such beneficence in securing a prolonged peace; in elevating the physical, moral and mental stamina of our people; in acting as a great leavener whereby we may avoid fatal class distinction; in uniting men of all walks of life in a common national

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interest which shall forestall the portent of internal civil or industrial strife. Some day this nation will come to universal service. Many think it will be very soon; many think only in some great crisis; some think it is fifty years away. But it is coming; that is certain. The War College of the War Department has this to say of universal service: "Broadly speaking, universal service being maintained by a tax upon manhood as well as upon wealth, distributes more reasonably the effort of the Government, supplementing the universal system of education which it rounds out; it broadens and educates the youth of the nation individually and in duty to the State, offsetting the harmful influences of crowded modern conditions of life; it improves and builds up the physical characteristics of the people of a nation; and finally when coördinated with other essential features of national life—and it is inseparably connected with them—it improves every condition thereof and harmoniously secures the maximum of military preparedness now so essential to the very existence of the modern nation in peace as well as in war." Why should not our plans embrace that eventuality? Why should we not forestall the inevitable—nay, lead the way for the physical and moral betterment of the people? Nearly every boys' school and college is today giving, or is about to give, military instruction. The medical school can give instruction too, along lines which shall render its matriculates a most valuable asset to the nation in war as well as peace. My first proposition then for the training of Medical Reserve officers for the Army and Navy is governmental provision for the establishment of instruction in sanitary tactics in all recognized medical schools.

I have discussed with many officers of the Medical Reserve Corps the needs and shortcomings of the system for instructing these officers. The one need to which they all unitedly testify is that of personal teaching. Systematic, regular personal instruction, is, for any great body of American physicians, impracticable. The practicing physicians are too busy, too scattered, too uncertain as to hours for systematic assembly for elementary instruction. I submit therefore that the only practicable plan for training of this character to any appreciable percentage of the medical men of the country is the proposed undergraduate training in the medical schools of the country. It can thereafter be supplemented by instruction as is now in vogue in both Army and Navy.

Having thus outlined a scheme of medical training for the undergraduate student of medicine, and furnished reasons for this innovation, I shall now pass to a brief statement of the plan of instruction of graduate physicians of the Medical Reserve. The training of doctors who after graduation voluntarily elect to continue their affiliation with

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the Medical Reserve Corps of Army or Navy should be systematic, tend towards organization as well as education, and lead to classification of all available physicians according to their special abilities and special line of professional endeavor.

The course proposed here is a four-year correspondence course to be conducted by the Surgeon General of the branch of Reserve activity elected. During this four-year course the matriculates will be regularly commissioned in the Reserve Corps of the section of the service selected and as such, be available for active service in time of real or threatened hostilities. They will be required to participate in the four-year correspondence course for Medical Reserve officers and also in annual summer maneuver camps for a period of not less than fifteen days.

At the termination of the second year of the correspondence course those who have complied with foregoing requirements and whose papers in the correspondence course average up to a standard set by the Surgeon General, will be invited to take an examination in the subjects which they have studied. The successful candidates will be awarded a certificate of eligibility for appointment as captain in the medical section of the Officers' Reserve Corps of the Army, or as past assistant surgeons of the Medical Reserve Corps of the Navy. These certificates will authorize the appointment to these grades of these men upon completion of five years' service in the Reserve Corps in time of peace, or the immediate commission in the grade for which eligibility is held as vacancies occur, in time of war, as hereafter provided.

At the termination of the fourth year of the correspondence course and the fourth annual instruction camp or cruise, Medical Reserve officers holding the eligibility certificate for captain will be invited to participate in an examination in sanitary tactics, and, if found qualified, will be awarded certificates of eligibility for appointment to the grade of major in the Reserve Corps of the Army, or surgeon in the Reserve Corps of the Navy. This certificate will render its owner eligible for appointment to the grade designated in Army or Navy, as the case may be, as vacancies occur, whether in time of war or peace and without further examination than physical. Promotion to the grade of captain or past assistant surgeon and promotion to the grade of major or surgeon will be by seniority and length of service, with the proviso that an officer must hold a certificate of eligibility and be physically fit or, otherwise, be required to submit to a written examination in sanitary tactics as well as a physical examination.

The purposes of the examinations at the end of the second and fourth-year courses are to relieve Medical Reserve officers from the burden of indefinite period of preparation for examination; to offer them an incen-

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tive to successful completion of an arduous course; and to enable the Government to possess at all times a systematic classification of qualified Medical Reserve officers, so that, in time of war, no delay will be entailed in designating them for particular duties.

The officers who fail to pass the examination for certificate of lower or higher grade may take the past year's course again and be then reexamined, when, if successful, they will be commissioned in due time without loss of files or position derived from length of service.

Finally, an officer may still be promoted when his vacancy comes in line of seniority, provided he does pass a qualifying examination even though he has failed to secure certificate of eligibility. This promotion examination will be more rigid than the ones already described because the department will demand evidence of especial merit in these delinquents. The examinations will ordinarily be held at the various maneuver camps or places of instruction of the Medical Reserve officers and during the period of instruction. In this way, there will be least incommodity to the department as well as the Reserve officer. The examination will be brief, practical and qualifying. It will not be competitive. Papers will be marked on a basis of qualified or unqualified.

The question arises as to the advancement of medical officers of the Officers' Reserve Corps on the active list, who by law are not permitted to serve in higher grades than first lieutenants, nor hold higher commissions than that under which they serve. These officers, like others in the Medical Reserve Corps, will have taken the course prescribed and will have qualified for promotion. A solution of this problem is offered under the discussion of military organization.

When a Reserve officer has completed his undergraduate and graduate training course, he is then considered qualified as a Reserve Medical officer. It is necessary, however, to adopt some system for keeping in touch with this proficient officer, in order to hold his interest and to keep him acquainted with the changes in Medical Department administration and advances in the art of the military surgeon. To this end, the Surgeon General of each service will cause a bulletin to be prepared quarterly. This bulletin will recite changes in regulations which affect the Medical Department administration, changes in the Manual of the Medical Department, General Orders of the Department affecting the Medical Department, and all other information of a general nature concerning changes in the policy or instructions for Reserve medical officers. A card of acknowledgment will be inclosed in these circulars, on which the receiving Reserve officer will signify receipt of the publication and his present address. This will keep the address of all Reserve officers reasonably up to date. He will also certify on the reply card

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that he has faithfully acquainted himself with the contents of the circular.

These graduate officers shall further receive field training at such times and places as the department shall designate. It is contemplated by the writer's plan to give these officers a fifteen-day period of field training every third year or more often if practicable. At the time these officers report for this course of field training, they shall be rigidly examined physically. Any evidence of organic disease or physical disability for field service will cause the possessor to be relieved from attendance upon field exercises. He may still remain on the list of Medical Reserve officers available for service in base or general hospital in time of war, provided the medical board finds him physically fit for this class of service. Otherwise he will be retired from service. This retirement will permit him on occasions of special ceremony to wear the uniform of the highest grade held by him, and entitle him to the honorary use of his title in full, with the additional designation thereafter, "Ret."

The Medical Reserve officer who desires advanced study in sanitary tactics, will be able to gratify his taste by applying to the Surgeon General of his service for authority to take the post graduate correspondence course. This will be a one-year course for graduates of the foregoing courses, and will be purely voluntary. It will consist chiefly of problems in sanitary tactics, map and visibility problems. Participants who successfully complete this course will be given credit on their efficiency records.

Under the system thus outlined the instruction of the Medical Reserve Corps will cease to be a haphazard matter. It will look with foresight and completeness upon the whole situation. It will act as a means of distinguishing the special abilities and entire capabilities of the personnel, so that suitable officers may receive the recognition of merit and devotion, by increased rank and responsibility, and so that the Surgeon General will, in the emergency of war, have an efficient means of determining the proper assignment of this vast personnel. In short, it is a system making for efficiency, for breadth of view and practical success.

In concluding these remarks on training I have considered a plan for a national medical school for the three sister services of the Army, Navy and Public Health. Such a plan is without question farsighted, rational and excellent for the training of officers for these three services. Whether it is now practicable is a matter of opinion, but it is beyond question not practicable to have any great percentage of American medical students pass through such a school and is therefore not

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concerned in a plan for national training of the Medical Reserve Corps.

It is, however, possible either that such a national school or the three separate schools, whichever plan prevails, should give special courses in public hygiene or other pertinent subjects to selected officers of the Medical Reserve Corps. This matter invades the kingdom of the policy of War and Navy Departments. I will therefore merely incorporate this idea as a suggestion of possible future development of the training of the Medical Reserve Corps.

In this connection, as reasonably as elsewhere, I may mention that I have considered the practicability as well as the advisability of including a discussion of the utilization of the officers of the Public Health Service in this scheme of a Medical Reserve Corps. My reasons for not doing so are briefly the following: The Public Health Service, like the Medical Departments of the Army and Navy, is a standing service and has a semi-military character. Its members would readily assume duties in either of the sister services in time of need provided such action would be politic. But, in point of fact, this corps is highly specialized in public hygiene and cannot be spared from this service in time of peace or war. War, by upsetting normal conditions, by markedly modifying normal channels of human travel and normal modes of life, and by subjugating all other considerations to military necessity, renders the duties of a Public Health Service more pressing in time of war than in peace. Witness the health conditions in Europe for the past two years and the important rôle of public health officers there. It is, therefore, from no spirit of narrowness, nor yet from lack of thought, that I have failed to count the Public Health Service as an asset of the Medical Reserve Corps. The officers of the Public Health Service are already liable to serve their country in military or civil capacity in time of war. I believe they can best do so through such training, organization and utilization as shall be determined in their own department.

So, also, have I very few words with reference to the Medical Reserve Corps of the Organized Militia, because this body is distinctly an asset of the militia and does not in my conception come within the province of the question submitted. In order that this paper may be rounded out, however, I will merely state here that the plan for the training, organization and utilization of the Medical Reserve Corps of the Organized Militia of both Army and Navy is best exemplified in my opinion in the Circular, No. 19, of the War Department, on that subject, issued October 14 of the present year.

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SCHEME FOR MILITARY INSTRUCTION OF MEDICAL RESERVE OFFICERS

1. Undergraduate instruction for "Medical Cadets."
   (*a*) Basic class instruction in sanitary tactics[1] for third and fourth year medical students.
   (*b*) Fifteen-day annual instruction, afield or afloat for third and fourth year medical students.
2. Graduate instruction for junior officers, Medical Reserve Corps.
   (*a*) Two-year correspondence course leading to classification of eligibility for grade of captain or past assistant surgeon.
   (*b*) Two-year correspondence course leading to classification of eligibility for grade of Major, Medical Reserve Corps, U. S. A. or Surgeon, Medical Reserve Corps, U. S. N.
   (In both (*a*) and (*b*) annual field instruction for not less than fifteen days.)
3. Postgraduate instruction for graduates of correspondence course.
   (*a*) One-year postgraduate correspondence course in problems in sanitary tactics (optional.)
   (*b*) Quarterly departmental bulletin of information and instruction.
   (*c*) Tri-annual fifteen-day period of instruction, afield or afloat, combined with tri-annual physical examination.
4. Special instruction for (1) Candidates for admission to the Regular Army, Navy or Public Health Service Medical Corps.
   (2) For designated members of the Organized Militia as prescribed by law.
   (3) For selected officers of the Medical Reserve Corps under such rules as may hereafter be adopted by the War, or Navy and Treasury Departments.
   (*a*) Army Medical School.[2]
   (*b*) Navy Medical School.
   (*c*) Bureau of Instruction, Public Health Service.

The instruction of undergraduate medical students will be divided into a two-year course, and will be voluntary or compulsory for all physically sound students in third and fourth-year classes, as shall be determined individually by the faculty of each university or medical

[1] By Sanitary Tactics, throughout this paper, reference is made to all instruction in matters of importance to medical officers.

[2] Should (*a*) (*b*) and (*c*) of Class 4 ever unite, a public service medical school may be established with special correspondence for Medical Reserve officers. This plan is considered at present impracticable.

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school participating. It is clearly to be understood that, under this plan, the Government does not exercise compulsion upon either the school or the individual student of medicine. The instruction will only be instituted in medical schools requesting the course, and which agree to comply with the provisions laid down by the Government. Among these will be a minimum limit of students subscribing to the course. The medical school may, if it so desire, require medical students to pursue this course in sanitary tactics in order to receive a diploma, but this decision rests solely with the school, as will be seen hereafter.

The instruction is confined to the two upper classes for many reasons: The first two years of medical school cull out many inconsequential students, whose useless instruction in this branch is thus avoided. The student in the first years of medical training is sufficiently overwhelmed by reasons of entrance into a new realm of thought, without pressing the additional phase of military life upon him. The younger student is not sufficiently prepared, because he lacks knowledge of the elementary branches of medicine, for the study of a special branch. The serious nature of the study of medicine and its branches is better appreciated by higher students. Finally, the instruction of third and fourth-year students being continued after graduation, gives continuity of instruction from undergraduate to graduate.

The instruction is divided into an academic course to be conducted during the school year, and a field course of not less than fifteen days duration, to be held during the vacation period. The medical school faculty may, if it so elect, require attendance on the academic course but leave the field training as a voluntary course; or it may make both courses voluntary or compulsory as the school in question shall decide. The Medical Department shall urge medical schools to make the course a part of its regular curriculum and, as such, require attendance and proficiency for graduation; but governmental influence in the decision will go no further.

SCHEME OF BASIC INSTRUCTION COURSE FOR MEDICAL CADETS

Participants: Third and fourth-year medical students in recognized medical schools.

Hours: One hour weekly for eight months, or thirty-two instruction periods. (This to be increased to two hours weekly when practicable.)

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Course for Third-Year Students

First semester—sixteen hours.

Army and Navy:

Practical Instruction: Drill Manual for Medical Department, Army or Navy.

	No. of hrs.
School of the soldier	4
School of the detachment	4
Litter drill, unloaded and loaded litter	3
Ambulance litter drill, obstacle litter drill	2
Bearer drill without litters	1
Muster, inspection, and manual of saber	1
Military or naval salutes, courtesies and honors	1

Second semester—sixteen hours: Didactic lecture—quizzes in subjects such as the following:

Army:

1. Organization of the land forces of the United States.
2. General functions of the Medical Department in garrison.
3. General functions of the Medical Department in the field.
4. System of evacuation of wounded from firing line to base.
5. The duties of regimental medical officers in active service.
6. The ambulance company and its war function.
7. The field hospital and its war function.
8. Field Service Regulations directly affecting the Medical Department.
9. Army Regulations and Army Orders.
10. Examination and selection of recruits.
11. The personal hygiene of the soldier.
12. Military hygiene in garrison.
13–14. Camp and field sanitation.
15. The service rifle and the wounds to be expected from it.
16. The artillery of armies and special features of shell wounds.

Navy:

1. Organization of the naval forces of the United States.
2. General functions of the Medical Department of the Navy in hospitals, marine barracks, navy yards, etc.
3. General functions of the Medical Department of the Navy in sea service.
4. System of evacuation of the wounded of a brigade in a land action.
5. Duties of the regimental medical officers of a regiment of Marines on expeditionary duty.

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6. The transportation of wounded of an expeditionary brigade of Marines.

7. The hospital service of an expeditionary naval force.

8. Navy Regulations and Department Orders.

9. Examination and selection of recruits.

10. Personal hygiene of sailor and marine.

11. Military hygiene in barracks, and navy yards.

12. Camp and field hygiene.

13–14. Naval hygiene (2 hours).

15. The service rifle and character of its wounds.

16. The big guns of navy and coast defense and characteristics of shell wounds.

Course for Fourth-Year Students

First semester:

Practical Instruction: Drill Manual for the Medical Department, Army or Navy.

School of the soldier.

School of the detachment.

Litter drill, unloaded and loaded litter.

Ambulance litter, obstacle litter and ship litter drill.

Muster, inspection and ceremonies.

Military or naval honors and courtesies

In this fourth-year course, students with special aptitude will be utilized as assistant instructors in drill of third-year students.

Second semester:

Army:

Lectures in the following:

Sanitation in camp and field.

Medical supply system in the field.

Medical property, how obtained, cared for and accounted for.

Management of a hospital mess.

Treatment of gun-shot wounds (two lectures).

Treatment of shell wounds (one lecture).

Military hygiene (two lectures).

Military correspondence.

Military law.

Military discipline and customs of the service.

Officers' individual equipment.

Navy:

Lectures in the following:

Sanitation in camp and field.

Medical supply system of Navy.

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Medical property, how obtained, cared for and accounted for.
Management of a hospital mess.
Treatment of gun-shot wounds (one lecture).
Treatment of shell wounds (two lectures).
Naval hygiene (two lectures).
Naval system, correspondence.
Naval law.
Naval discipline and customs.
Officers' individual equipment.

Field Instruction:

The field instruction for students will be practical and be concerned with such subjects as the following:

Army:

Field equipment, officers' and men.
Tent-pitching, hospital and shelter.
Establishment of first aid station.
Establishment of dressing station and evacuation of same.
Establishment of field hospitals.
Equitation and care of animals.
Camp sanitation.

Navy:

Service equipment for officers and men.
Exercises in aid stations and removal of wounded from field.
Exercises in caring for wounded aboard ship during action.
Naval hygiene and sanitary inspection aboard ship.
Field sanitation.

The field instruction of medical students may be held in special camps of instruction for medical students and Reserve officers, or as a part of the general instruction camps for all branches of the service. Special instruction camps for medical officers of the Organized Militia were held in this country in 1909. They were eminently successful. It appeared to the writer, in company with other officers coming to such camps from general instruction camps, that the special camps of instruction for the medical officers were far more profitable. Moreover, it would be absurd as well as impracticable to have camps of instruction overrun with reservists of one staff branch. My plan therefore contemplates that the camps of instruction for Army reservists in the class, "Medical Cadets," will either be held separately or as an adjunct to general instruction camps. In the Navy, also, the student medical cadets will either be assembled for cruising on hospital ships or instruction in special camps at Marine barracks, navy yards, military posts

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or other places selected by the department. The students will be required to subject themselves to military discipline under such rules or regulations as the department may adopt. So far as possible they will be under the jurisdiction and instruction of their school instructor in military or naval sanitary tactics while at these instruction camps, in the same manner in which at present, the inspector-instructors of the Organized Militia participate in the summer maneuver camp of their troops. However, any students whose homes are far removed from the rendezvous of their school may, by applying to the department, be permitted to attend the instruction camp nearest their homes.

Thus far our plan has been developed solely with reference to undergraduate medical students, but now we will consider the training of the Reserve officer.

Medical cadets, who have attained their degrees and also have qualified in the two-year course in sanitary tactics, will be granted commissions in the Medical Reserve Corps of the Army or Navy upon their individual application provided that they are physically qualified for active service, without further mental examination. The department will reserve the right to refuse a commission to any candidate who is not considered of good moral character, or who does not possess aptitude for the military service. A qualified medical cadet who upon graduation desires to enter either the Medical Department of the National Guard or the Medical Reserve Corps of the National Guard, Army or Navy will be given a certificate signed by the instructor in sanitary tactics, stating the applicant's qualifications for duty as a medical officer. Finally, a medical cadet who is willing to serve his country in time of war in a medical capacity, but who is unwilling to assume the obligations of the Medical Reserve Corps, will be advised to furnish annually to the office of the Surgeon General of the service concerned his present address. The office of the Surgeon General will keep these lists and addresses for use in war emergencies. The men on this list can only be commissioned after all members of the Medical Reserve Corps.

The newly graduated medical student thus commissioned in the Medical Reserve Corps of the Army or Navy will be given an option by the Department at this point in his career. Should he have passed from medical school to interneship or externeship of a civil or military hospital, he will be permitted to postpone his postgraduate course until he shall have completed his hospital service and entered upon private practice. This will not militate against his holding his Medical Reserve Corps commission during said service, nor will it release him

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from the obligation to serve his country in case of war, but it will release him from pursuit of correspondence or field training course, should he so elect while in hospital service. This concession will obviously be mutually beneficial to the young officer and to the Government.

The postgraduate course shall be a four-year correspondence course, conducted under the direction of the Surgeon General, by the Department of Care of Troops and Medical Reserve Corps Correspondence School at the Army School, Fort Leavenworth, Kans., for the Army and by the Naval Medical School, for the Navy, and supplemented by a fifteen-day full training period not more often than once annually, at such time and place as shall be designated by the War or Navy Department. Custom will make it probable that officers of the Medical Reserve Corps shall receive their training, afield or afloat, in their section of the United States and at a time suitable for the recreative effects of outdoor life. Should the number of reserve officers be very large, the field instruction will be bi-annual, so that each year's camp will be within practical limits. The correspondence course will, in a general way, proceed along similar lines to the present system. The papers will be corrected, graded and returned to the student as at the present time. At the end of two years' pursuit of this course, reserve officers who have faithfully lived up to its very reasonable requirements will be invited to take an examination in the subjects already studied for qualification for the grade of captain in the Medical Reserve Corps of the Army or passed assistant surgeon in the Navy Reserve. Similarly, at the termination of the four-year course, these reservists may take an examination for qualification for promotion to the grade of major in the Army Reserve, or surgeon in the Navy.

Medical Reserve officers who have thus completed their undergraduate course as medical cadets and their four-year postgraduate course in the correspondence school will be regarded as fully proficient members of the Medical Reserve Corps. This reserve will be trained, and organized and will have members in the three grades of rank now permitted by law in the Army and which will, no doubt, be similarly granted to Navy Reserve. Thus, as these young officers pass forward in experience and achievement, their value to the Government will be magnified.

The only remaining difficulty is to keep in touch with these men, and to keep them in touch with the progress of the Medical Department of their service. This is provided for in my plan in the following way:

It does not appear to be practicable to extend the correspondence course already outlined over a greater number of years than four.

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It is, moreover, to be observed that faithful pursuance of this course has definite rewards in the proficiency certificate for advancement. This measure is also necessary for a practicable plan, because it is quite human for the man who has pursued such a course voluntarily to expect preferment over his untrained comrade. He is not promoted by reason of the completion of the course, but only after he has completed his period of potential service. Thus, he is encouraged to pursue the correspondence course and subsequently encouraged to remain in service so that he shall, in time, reap the reward of fidelity.

I propose, therefore, that a bulletin or circular be issued quarterly by the Surgeon General of each service.

This bulletin shall have three features:

1. *Information:* Its prime purpose will be to impart information of progress, advances, or changes in Medical Department Administration, Military Hygiene, Military Surgery, Military Medicine, Sanitary Tactics and Departmental Regulations.

2. *Certificate:* A certificate will be appended to be signed and returned by the reserve officer certifying on honor that he has carefully and deliberately read and considered the contents of the bulletin, and made such mental or other note of same as will enable him to act in accordance with contained directions.

3. *Address:* The officer will note whether his address is the same as on file in the Surgeon General's office, and, if not, furnish the department with new address.

By these quarterly bulletins, the department will be enabled to keep in progressive relation with its reserve officers, with least of unnecessary labor and red tape.

In addition to the foregoing, all reserve medical officers of this class will be required to attend a military or naval camp, field instruction, or cruise as will be determined by the department at least once in every three years.

Prior to entering upon this field instruction, an officer will, in the first place, be examined physically to determine whether he is fit for active field service. Should he be found unfit, he will not be permitted to engage in such instruction, but will be reported to the Surgeon General by the examining officers, with explicit statement of the cause of disability and the further opinion as to the officer's physical fitness for duties other than those of field service. Upon these reports, the officer may be wholly retired from active service, or transferred to a different class of medical officers available for restricted classes of duty. The latter classification will only be made subject to the consent of the officer, who will be entitled to retirement if so desired by him.

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ORGANIZATION

I have now outlined a system of training of officers of the Medical Reserve Corps and shall pass to the subject of organization. The organization may be considered from a military and political viewpoint. Prior to presenting a plan of political organization, I beg my reader to observe that the following plan is offered in order to make the discussion complete, and is in no degree essential to the remainder of the plan, being, in fact, a distinct subject. Should organizations such as the following be considered chimerical or inadvisable, they may be set aside without affecting the main plan. Attention is invited to the idea that these projected societies meet in conjunction with established state and national societies much in the manner of special sessions of these societies.

The political organizations of the Medical Reserve Corps of the Army and Navy shall be distinct from each other, and each national in character.

The purposes, organization and government must be determined by the membership, but a scheme, skeletal in character, is outlined in order that the reader will be able to consider the practicability of a national association. This should be clearly understood.

The national association of the Medical Reserve Corps will meet annually at the time and place of meeting of the American Medical Association, but not in a way which will conflict with its sessions. Its prime purposes will be to foster patriotism and preparedness for war service among American medical men, and to strive for the best interests of the corps.

The association will have a national council whose membership will be based on one delegate for every State in the Union. Additional delegates will be allowed to any State having more than 200 members of the Reserve Corps in the ratio of one delegate for each 200 members or remaining major fraction of that number. In the event of a State being entitled to more than one member of the national council, this State council may, if it see fit, delegate its proportionate number of votes to a single representative. The especial functions of this council shall be to elect the usual administrative officers and an executive council, and to transact the affairs of the association. The executive council will represent the Medical Reserve Corps in the adjustment of the affairs of the corps with the Regular Medical Corps.

The State association meets annually. Its prime purpose is to foster the State Medical Reserve Corps by the words and example of the leading practitioners of the State. Customarily the association will

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meet at the time and place of annual meeting of the recognized State Medical Society in order that the attendance on both societies will be mutually benefited. The State association will evolve its own government and procedure, but, in a general way, its purposes are to foster patriotism and to advance the interests and power of the Medical Reserve Corps.

The State association elects delegates to attend the annual meeting of the association of the American Medical Reserve Corps, Army or Navy, as the case may be.

The State association has no system of delegates or representative members, as does the national association. Its entire State membership is eligible both for attendance upon its transactions and for voting on all questions. The State association then is the primary unit in national organization, and, as stated, every member of the Reserve Corps practicing in the State has the privilege of voice and vote in its proceedings. For purposes of study, organization, or, in fact, any purpose other than political, reservists in cities or densely populated communities may organize clubs or societies. These will not militate against the functions of the national and State societies. The best evidence of the value of such local societies is the fact that members of the Medical Reserve Corps in large cities are now spontaneously taking steps to effect organizations of this character.

The military organization has been touched upon in the development of the training system, and may be diagrammed schematically in the following manner for Army and Navy:

1. Medical Cadets. Third and fourth-year medical students under military instruction.
2. Commissioned officers, Medical Reserve Corps.
   - (*a*) First lieutenants, M. R. C., U. S. Army, or assistant surgeons, U. S. Navy.
   - (*b*) Captains, M. R. C., U. S. Army, or passed assistant surgeons, U. S. Navy.
   - (*c*) Majors, M. R. C., U. S. Army, or surgeons, U. S. Navy.
   - (*d*) Majors, M. R. C., U. S. Army, or surgeons, U. S. Navy; "Consulting Surgeons."
3. Retired officers, Medical Reserve Corps.
   - (*a*) Retired from field service.
   - (*b*) Wholly retired.

The training and utilization of the medical cadets practically covers the discussion of the rôle of these student reservists. The students pursuing this course will be required to agree to give the course of instruction regular attendance and sufficient attention to insure pro-

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ficiency, and to show obedience and respect to their superior officers. Failure to conform to reasonable requirements will cause dismissal from the corps.

The commissioned officers of the Medical Reserve Corps of the Army and Navy enter the service in the grade provided by law and under the conditions prescribed by the National Legislature. In time of peace, when they have served five years (or such time as may be prescribed by law), they will, if qualified, be promoted to the next higher grade. In time of war, they will be advanced as vacancies occur. A second promotion will in time of peace be conditional upon length of service (to be determined by national legislation), physical and mental qualification and seniority. In time of war, only the physical and mental qualifications and seniority are requisite, as promotion depends upon the incidence of vacancies.

The foregoing is confusing for the simple reason that as yet the Navy has no system of advancement for Reserve officers, and the Army system as applied to the Medical Department holds unsolved problems. As the Army legislation now stands, a certain percentage of Medical Reserve officers must be in the advanced grades. This percentage is the existing ratio in the Medical Department of the Regular Army. Acceptance of existing conditions in the Army makes it obligatory for the writer, in order to conform to practicability, to assume that subsequent to the initial advance of certain Medical Reserve officers to conform to the prescribed ratio in each grade, advancement in peace and war in the Army Medical Reserve Corps must be by filling vacancies rather than by a stated period in each grade. For the purpose of the problem it is necessary to assume for the Navy similar legislation.

The question now arises as to the rank and grade of Medical Reserve officers of the Army and Navy on active duty. Under the provisions of the National Defense Act of 1916, the War Department will be permitted hereafter to call into active service officers of the medical section of the Officers' Reserve Corps in the grade of first lieutenant only. The same bill provides that an officer of the Officers' Reserve Corps cannot be called into active service in lower grade than that held by him in the Reserve. It is presumed by the writer that similar legislation will be given the Navy, and so the problem is faced with these provisions.

Under the present law in the Army, a certain percentage of the officers of the medical section of the Officers' Reserve Corps must be given commissions as majors in the medical section; a certain percentage, commissions as captains in the medical section. These percentages are to be in the same ratio as prevail in the Regular Medical Corps. The

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original advancement will possibly be made by seniority of service. It is a matter of policy with the War Department and is beyond the province of this paper. Subsequent advancement is provided for as a part of the plan of training and organization as already outlined. It would be manifestly unjust to deny equal opportunity for promotion to active members of the medical section of the Officers' Reserve Corps as is given by law to inactive members.

The following solution of the difficulty is proposed:

Medical Reserve officers on active duty in time of peace are by law limited to the grade of first lieutenant, but, in time of war, officers of the Medical Reserve Corps on active duty may be placed in service in grades of captain and major. Now in the event of war, the resultant increase in the Army will provide a definite percentage of vacancies for Medical Reserve officers in the advanced grades. To give all of these vacancies to either the active or inactive list of the officers of the medical section of the Officers' Reserve Corps would be manifestly such rank injustice as to demand amelioration from both.

It is suggested, therefore, that the vacancies in each advanced grade be allotted to the active and the inactive list of the Reserve Corps in exact ratio to the numerical strength of the two branches of the corps. Thus were there 1,000 vacancies for majors, and the Reserve Corps active was to the Reserve Corps inactive as 1 to 9, the inactive list would be awarded 900 commissions for majors in the medical section of the Officers' Reserve Corps on active duty and the active Reserve Corps would be awarded 100 commissions in the same grade. From each branch of the corps, active or inactive, the officers will be taken by seniority. At the termination of hostilities, officers formerly on the active list of the Reserve Corps will, if they elect to remain in the military or naval service, revert to their former grade. In this way the provisions of the bill will be complied with, no injustice accrue to the inactive list of the Medical Reserve Corps, and an act of signal justice be done to the meritorious active list of the Medical Reserve Corps. This has been considered in detail because it is a problem now before the Army Medical Department and will doubtless present itself in similar form to the Navy. A practicable plan must take cognizance of the situation.

In time of peace, the Surgeons General of Army and Navy will maintain a list of Medical Reserve officers, who are regarded as specially fitted for the execution of certain special duties in connection with the operation of the Medical Department in time of war.

These officers will be designated "Consulting Surgeons," and will be commissioned in the grade of major in the Medical Reserve Corps of

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the Army or surgeon in the Navy, when placed in active service in war or threatened war in the discharge of the special duties pertinent to the grade and designation. Medical Reserve officers, who have been designated in time of peace as "Consulting Surgeons," will thereafter be exempt from routine attendance on camps of instruction, cruises and like duty. The designation "Consulting Surgeon" is distinctly not to be considered honorary. Furthermore, it is manifest that it will not be possible to so designate all reservists who are exceptionally skilled in their specialty. It primarily means that the surgeon in question is, in the opinion of the Surgeon General, fully worthy, not only for his skill and achievement, but also on account of his administrative ability as demonstrated by a distinguished career, to be entrusted with the lives and well being of the officers and men who are referred to him on account of his exceptional knowledge, in one of the following branches:

1. Military surgery, general.
2. Orthopedic surgery.
3. Orthodontic surgery.
4. Operative surgery, special.
5. Treatment of epidemic disease.
6. Administration of large hospitals.
7. Medical or surgical supply on vast scale.
8. Control of epidemics (epidemiologists.)
9. General or special bacteriologists and pathologists.
10. Ophthalmologists, aurists, rhinologists.
11. Neurologists.
12. Other special qualification.

Officers of the Medical Reserve Corps who have been found physically disqualified for field service, but whose patriotism induces them to seek to be regarded as reserves of the United States, may be transferred upon their own application by the Surgeon General from the active list to the limited list, provided the medical examining board has found them physically qualified for military duties other than field service. They will then be available for service at the base, or in home hospitals or on similar duty in case of war. They will not be available for duty in the zone of advance nor lines of communications nor for sea duty. Customarily no officer will be graded in this limited class unless he is distinctly regarded as highly distinguished in his profession and specialty.

Medical officers of national reputation are desired for these special duties, because the Medical Department desires to give the best service available and because the country expects such service. The regular Medical Corps will be swamped by administrative work; the rank and file of the Reserve Corps will be fully occupied with the care of the rank

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and file of Army or Navy. Highly skilled specialists will be needed for certain work. This plan contemplates the selection of such men from the ranks of the Medical Reserve Corps in time of peace, so that in time of war the Surgeon General will be already supplied with the names of men qualified for such duty. This recognition of the special qualifications of certain men is an essential part of any rational scheme for utilization of the Medical Reserve Corps. It is in line with the practical demonstration of the needs of the Army and Navy in the war between the States. It is one of the most characteristic things of the medical phase of the present great war. Finally, it gives the corps a fitting honor, reward and recognition for its distinguished members—a reward which is not provided under the present system.

The foregoing plans for the selection and designation of specialists, as an integral part of the system of organization of the Reserve Corps in time of peace and its utilization in war, is to be supplemented by a card efficiency record for every reserve officer. This efficiency record will be kept by the Surgeon General and will be conducted along the same broad lines governing the efficiency record of officers on the active list. This record shall show the following data:

1. Record in course of sanitary tactics while a medical cadet.
2. Record in four-year correspondence course for Medical Reserve officers.
3. Record in instruction camps, cruises, etc.
4. Record in promotion examinations for eligibility certificate.
5. Record of prescribed physical examination.
6. Special qualifications as indicated by—

(*a*) Special degrees.
(*b*) Special line of practice of profession or special qualifications.
(*c*) Hospital training.
(*d*) Record of active service.
(*e*) Any additional data available bearing on military efficiency.

All examining officers and all commanding officers of camps of instruction will report on the Reserve officers participating—as "qualified" or "not qualified."

The last class of officers under the subject of organization is the retired list. This is composed of officers retired from full duty to certain classes of duty, and officers wholly retired. Officers who are found physically disqualified for active field duty in the Army or sea duty in the Navy, but who are, nevertheless, vigorous men, who have achieved distinction in their profession, and are regarded by the department as capable of rendering efficient service in other less strenuous fields of work, may be upon their own application transferred from

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the active list to a special reserve list. These special reserves will be kept on the quarterly bulletin mailing list and will be expected to meet all requirements for Reserve medical officers, except that of field or sea duty. They will be utilized in war time in no further advance than the base, and will be physically examined before being placed on duty of any character. Officers wholly retired for physical disability, or for age limit prescribed by law, will cease to be either liability or asset to the War or Navy Department. They will be entitled to wear the uniform of their highest grade in the reserves on occasions of ceremony, and to use their military title followed by the designation "Retired."

UTILIZATION

The Medical Reserve Corps of the Army and Navy will be called to the colors in time of hostilities or threatened hostilities in such numbers as the nation requires. They will, in every instance, be called prior to the commissioning of volunteer medical officers. This does not prevent the appointment of officers of the Regular Army or Navy Medical Corps to volunteer grades, as specifically provided under the National Defense Act of 1916. Officers of the Medical Reserve Corps will not be permitted to hold simultaneously a commission in the Medical Reserve Corps and a commission in the Organized Militia for the simple reason that their services would of necessity be a false asset to one of the two.

Any officer who holds a commission in the Medical Reserve Corps will be liable to military duty when called to the colors, and must serve while required by the department. All officers of this corps will be clearly advised on this point. No officer of the Reserve Corps will be called to active duty in lesser grade than that held by him in the Reserves, and while on active duty he will be entitled to the pay and emoluments of his office.

Every officer of the Reserve Corps will be required to provide himself with the individual field equipment of an officer, with the exception of Medical Department equipment and, in case of junior officers, horse equipment.

The Medical Department of the Army and Navy will hold itself ready to provide this Medical Department equipment and the Quartermaster Department of the Army to furnish horses and horse equipment, when required for war service for reserve officers. Medical Reserve officers reporting at mobilization camps, concentration camps, or camps of instruction of the Army, or ships, navy yards, or other rendezvous of the Navy, will be required to bring with them the prescribed

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individual field equipment. Medical Reserve officers will not be required to supply themselves with other than active service or field equipment. The nature of this will be stated to each officer, together with a brief statement of information concerning the customs and ways of the service, in a bulletin supplied at the officer's acceptance of his commission. Bulletins relating to changes of uniform, field equipment, vital legislation, etc., will be issued from time to time by the Office of the Surgeon General in order to keep all reserve officers in touch with the service.

The general scheme for utilization of the Medical Reserve Corps is, briefly, as follows for each class:

Reservists, graded as consulting surgeons, who will usually be of the rank of major in the Medical Department of the Army and surgeon in the Navy, will be supplied in time of war to those places in which they may exercise their specialty with maximum efficiency. Thus, operators may be detailed to base or general hospitals and may, if they so elect, bring with them their operating force or team, including assistants, anesthetists, and nurses. Pathologists and other specialists will be utilized in a similar way in their distinct branch.

Owing to the marked tendency towards specialism in civil practice and the great numbers of specialists in the United States today, the Government cannot guarantee that all recognized specialists shall be detailed for special work. That is manifestly impossible where great bodies of men are at war and the first call of humanity is for the most simple first aid treatment.

Lord Northcliffe, referring to the sacrifices made by eminent men of the medical world, who forsook not only lucrative practice but highly specialized professional work for the elementary surgical relief of the firing line and the trench, says: "If there be degrees of chivalry, the highest award should be accorded to the medical profession, which at once forsook its lucrative practices in London or Melbourne or Montreal in a great rally of self-sacrifice. The figures of the great casualties among them bring home to those who have only the big hospital idea of the war doctor, sad facts that should lead to due understanding of this not sufficiently known veritable body of Knights Templars in this Great Crusade. . . ."

Officers of the Reserve Corps holding the grade of major in the Medical Department of the Army or of surgeon in the Medical Department of the Navy will be ordered to active service as required by the Department. Their efficiency record and special qualifications will be considered as far as practicable in assigning them to duty. Officers of the Medical Reserve Corps in the ranks of captain in the Army or

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past assistant surgeon in the Navy, will be commissioned in their own grade or advanced grade, according to the needs of the service. Once commissioned, they will be promoted by seniority in their special corps as vacancies occur. Lieutenants will be similarly dealt with.

Medical cadets will not be required to forego their medical training in case this nation takes up arms. Should they volunteer for service and be accepted they will be utilized in base or general hospitals as anesthetists, dressers, internes, etc., according to their degree of advancement in their professional studies. In this case they will be given a special grade of medical cadets, with suitable rank, pay and emoluments. They will not be utilized in the Army in the advance zone of military operations, and in the Navy will not be placed on sea duty. It would be impolitic to employ medical students in these hazardous posts because the demand for doctors becomes so great, in time of war, that this nation needs increased rather than lessened production. The purpose of the undergraduate medical training is primarily, therefore, to assure the nation that every graduate in medicine shall possess a sufficient knowledge of the military surgeon's special duties to enable him to serve his country efficiently in time of need. It is secondarily a consideration that medical students, having thus become acquainted with this military phase of medicine, may become sufficiently interested to seek to become permanently associated with the Medical Reserve Corps.

This discussion of the utilization of the Medical Reserve Corps is very brief, and in fact is only indicative of the general disposition of the classes of Reserve Officers described in the section on organization. The three features outlined in this paper are indissolubly associated, and much that is said under one section will serve to explain the general scheme for the other.

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FIELD MANEUVERS OF DIVISIONAL SANITARY TROOPS, LEON SPRINGS, TEXAS, NOVEMBER, 1916

By Major RAYMOND C. TURCK

Medical Corps, National Guard of Florida

(With twenty illustrations)

THE maneuvers of the sanitary troops of the 12th Provisional Division, as a unit, at Leon Springs, Texas, during November, 1916, were unique in that they were the first in the history of the United States Army; certainly not since the Civil War has there been so extensive a movement, nor one from which so much valuable practical information was gained. As in other pioneer movements, many preconceived plans and beliefs were shattered and many new ideas were gained. It is believed that these maneuvers will mark a new era in the evolution of modern medico-military work—at least so far as the United States service is concerned, and will lead to a development of this branch that will prove of inestimable value in time of need.

The maneuvers were uniformly most interesting and instructive for officers and men. Improvement in the efficiency of the divisional organization as a whole, and of the individual units, was noted from day to day. Interest in the problems increased and there was a noticeable improvement in the *esprit de corps* of the units, and in the morale of the whole organization. Particularly pleasing was the anxiety of many of the sergeants and enlisted men to know of the progress of the problems, and their desire to be told and shown what was being done with the units other than their own. The grasp of many of the junior officers and enlisted men of the problems as a whole was especially noticeable toward the end of the period.

The training was intensely practical; to work with real men and animals and equipment and machines over miles of territory is quite different from moving pegs on a map! The time element, the human element, gasoline, water, forage, food, supplies are all real factors, essential and often exasperating; it is one thing to hand a message from a Director of Ambulance Companies to an Ambulance Company Commander across a map game table, and quite another to actually send a messenger over miles of grass-covered trails, perhaps through fog or darkness; and quite different the moving of heavily laden field hospital wagons over miles of rocky, hilly, broken roads, from moving a red-topped tack from "a" to "z" on a 3-inch map—"the field hospital is now established at 'z'." Quite different! Maps do not consider—when a field hospital is to move in ten minutes—that an essential lead

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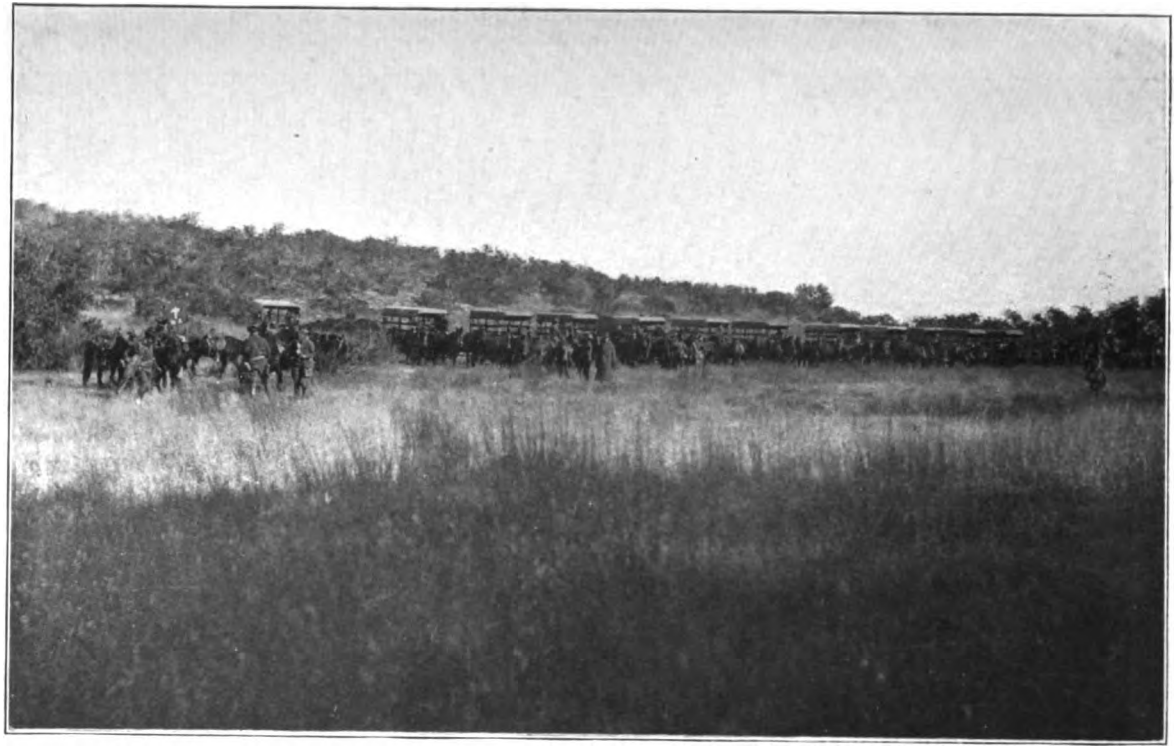

AMBULANCE COMPANY LYING IN RESERVE.

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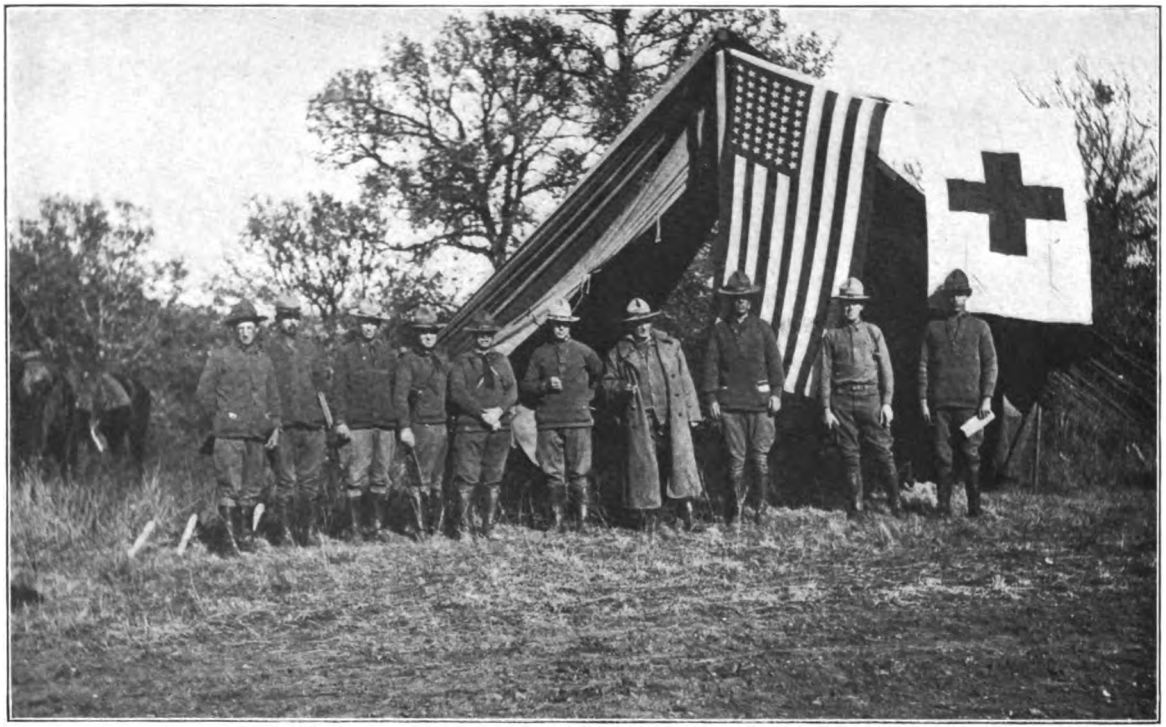

GROUP OF OFFICERS: RIGHT TO LEFT, CAPTAIN SINER, MAJOR SCOTT, MAJOR SAMSON, MAJOR FREW, LIEUTENANT COLONEL MUNSON, MAJOR SCHINDEL, MAJOR PIERSON, MAJOR STODDARD, MAJOR TUTTLE, MAJOR TURCK.

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mule may smash his halter into fine fragments and go galloping madly over 20,000 acres of fenceless hills and valleys, nor that an ambulance may smash a tongue or a wheel on a rocky terrace and pile its mules in a heap, nor that a pack-ass may kick off his pack on a cold morning; neither do maps show cactus or thorns or "jiggers."

Theoretical orientation is always easy, but one cold, foggy morning, it was noted that an umpire, an inspector, a signal company, 120 infantrymen, and a battalion sanitary detachment, all drifted around a wooded hill in the thick fog for more than an hour before locating each other or their designated positions. It is not to be inferred that the map game or theoretical instruction is valueless; on the contrary such preliminary instruction and study is invaluable. The necessity for, and the very great advantage of, previous training in service school or in map problems was abundantly demonstrated during the maneuvers.

The maneuvers were conceived, planned and executed by our Division Surgeon, Lieut. Col. Edward L. Munson, M.C., U. S. A.[1] Further comment than this, as to the thoroughness of the preparation for the work and the success of the whole movement, is unnecessary.

As illustrative of the scope of the work, its purpose, and the thought, care and labor incidental to its successful accomplishment, an extract from Divisional Special Order No. 59 is appended.

HEADQUARTERS, TWELFTH PROVISIONAL DIVISION, CAMP WILSON, FORT SAM HOUSTON, TEX.

November 11, 1916.

SPECIAL ORDERS
No. 59

EXTRACT

4. Maneuvers involving the use of sanitary units in active service will be held on the Leon Springs Military Reservation from November 18, 1916, to November 30, 1916.

Maj. S. J. Bayard Schindel, Nineteenth Infantry, is assigned as Commanding Officer of the Maneuver Camp, and of the troops engaged in these maneuvers from the time they leave this camp until they return thereto.

(*a*) All sanitary units of this division, and such regimental sanitary personnel as is mentioned in this order, will proceed on November 18 to Leon Springs Military Reservation for the purpose of these maneuvers. Sanitary personnel not mentioned in this order will remain here for duty with their respective organizations pending further orders.

(*b*) The Commanding Officer, Provisional Battalion, Signal Corps, with three companies of his command, will participate in these maneuvers for the

[1] Editor, THE MILITARY SURGEON.

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purpose of facilitating the transmission of orders and information, and he will report at once to Maj. Schindel for instructions.

(*c*) The Commanding General, Third Brigade, will designate a battalion of his command for duty at Leon Springs Military Reservation during these maneuvers, and will direct the commanding officer of the battalion so designated to report at once to Maj. Schindel for instructions.

(*d*) Provisional regimental sanitary detachments for maneuver purposes will be organized as follows:

. . . . . .

(One Field Artillery, one Cavalry, and five Infantry Regimental Sanitary Detachments were made up from the divisional personnel.)

(*e*) The sanitary units will be completed to approximately war strength.

. . . . . .

The distribution of enlisted personnel will be made to the foregoing organizations by the senior medical officer of the organization concerned.

(*f*) Each Ambulance Company and Field Hospital will operate its own mess. Provisional regimental sanitary detachments will be attached for rations and messing as follows:

To Field Hospital Co. No. 1, Wisconsin—the First Provisional Detachment
To Field Hospital Co. No. 1, Florida —the Second Provisional Detachment
To Field Hospital Co. No. 1, Virginia —the Third Provisional Detachment
To Field Hospital Co. No. 6, U. S. —the Artillery Detachment
To Ambulance Co. No. 1, Wisconsin —the Fourth Provisional Detachment
To Ambulance Co. No. 1, Oklahoma —the Fifth Provisional Detachment
To Ambulance Co. No. 6, U. S. —the Cavalry Detachment
To Ambulance Co. B, U. S. —Camp Headquarters Mess

(*g*) The march to Leon Springs will be made in two days, camping at Nine Mile Hill. The return march to Camp Wilson will be made in one day.

Equipment "C" will be carried.

The garrison ration will be used.

Folding field cots and bed sacks will be carried.

The tentage of regimental medical officers and enlisted men of the medical department, attached to regiments who are to go to Leon Springs, will accompany them.

The location, number and character of such tents will be reported in writing to the quartermaster of the division, not less than twenty-four hours before departure for the maneuvers, by the senior medical officer with each detachment.

Tents will be struck, packed for shipment and placed together within each organization ready for collection before 7 a. m. of the day of the march. Folded cots will be piled near the tentage, for collection and transportation by the Quartermaster's Department.

Surplus kits will be carried on the trains.

Officers are limited to 50 pounds of baggage, with a folding field cot and chair additional.

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HYPOTHETICALLY "DEAD," AFTER DRESSING AND PARTIAL TRANSPORTATION TO REAR.

SHOWING CARE AND ACCURACY IN DRESSING HYPOTHETICAL WOUNDS.

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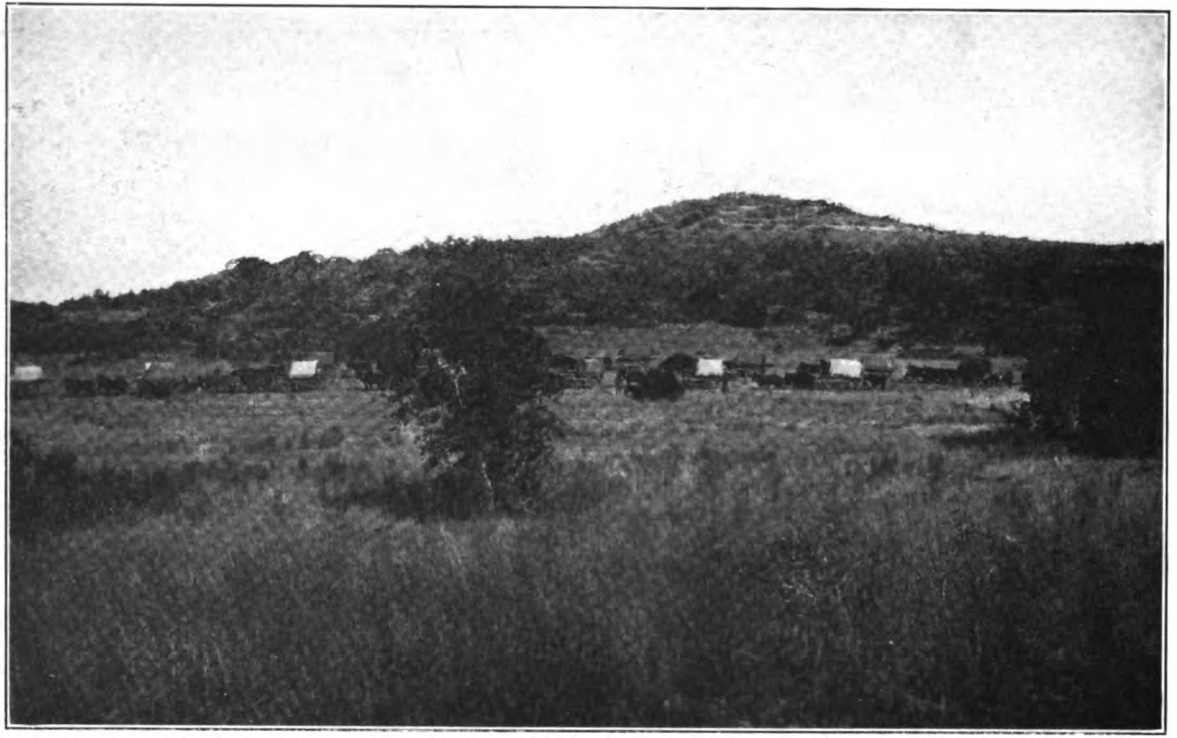

TWO FIELD HOSPITALS LYING IN RESERVE.

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Fuel, forage and straw for bedding will be supplied by the Quartermaster's Department.

The number of animals, draft, pack and riding, public and private, which are to be taken by each unit or detachment will be reported by the commander thereof, in writing, to the quartermaster of the division, not less than forty-eight hours prior to beginning the march.

Commanders of sanitary organizations and detachments will see that their men are properly supplied with serviceable shoes and clothing before beginning the march.

(*h*) Straggling on the march or at maneuvers is strictly prohibited. No personnel, other than the drivers, orderlies, disabled and cooks, will ride upon the ambulances or wagons.

Officers and noncommissioned officers will see that this order is enforced.

Commanders of sanitary units will see that their trains are kept closed up and that drivers are alert at all times.

(*i*) The senior medical officer with each provisional regimental sanitary detachment will take the pack mule and combat equipment of his regiment on the maneuvers. He will be responsible for the proper equipment of the officers and men of his provisional sanitary detachment.

In solving problems, the sanitary combat equipment carried on the combat wagons will not be available and must be disregarded in practice, but it will be referred to when necessary in orders, calculations, etc.

Any dressing or splinting material carried by the soldier, either in the first-aid pouch or in the Hospital Corps, or Orderly Pouch, may be used for demonstration purposes.

While the dressing should be adequate, there should be no waste of material, and any unused parts of bandages and dressings saved for further work.

Splinting should largely be done with improvised materials found in the field, as would be the case in actual war.

Surplus dressings, bandages, first-aid packets, shell wound dressings, and diagnosis tags, for use in maneuver work, will be carried with camp headquarters and issued as required.

Litters pertaining to the regimental sanitary detachments will habitually be carried by the personnel of such detachments.

(*j*) Medical maneuvers are primarily intended to exemplify the tactical use of the sanitary organizations and personnel and demonstrate methods of operation.

The tactical problems to be solved will include those proper to commands of all sizes and arms up to, and including, the division. They will demonstrate the sanitary service in positions of readiness, planned defense, attack, retreat and the rencounter. One or more problems will be carried out at night.

An important point to be determined by these maneuvers is the time required to clear the field. In some of the problems, the time factor will be made to dominate.

Cases able to walk with or without assistance will be evacuated in that manner. Cases requiring litter transportation will be removed on litters.

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Charges will be preferred against any soldier who permits a transportation case to walk. Litter bearers who are tired may rest, as they would in actual campaign, and those who report themselves as exhausted may be excused from further bearer work.

It is very important to work out the factor of physical efficiency in various problems.

(*k*) The maneuvers are also intended to test out the professional efficiency of the enlisted men of the Medical Department in the dressing of wounds and the treatment of fractures. It is expected that they will do most of the actual dressing work, either with or without the supervision of a medical officer.

The leader of each squad handling a case will write his name, rank and organization on the diagnosis tag of each such case. The first dressings, splints, etc., of such case will be critically examined by a medical board at each relief station, and the latter will endorse its approval or criticism—with specifications, in the latter case, on the diagnosis tag. At the conclusion of each day's maneuver, the diagnosis tags thus endorsed will be turned in to the division surgeon, who will transmit them to the commanders of the enlisted men by whom the dressings were applied.

Commanders will be thus informed of the proficiency, or otherwise, of their individual men in first aid, and will have pointed out to them the defects in the training of each man which should be rectified. This information should be the basis of further individual training of the enlisted men of the Medical Department found not proficient in any respects.

(*l*) Splints to be put on will be of proper sufficiency, size and shape, and will be suitably padded. Dressings will be properly located and of adequate size for wound protection. Bandages will be sufficient in size and amount to meet the needs of the injury. They will be put on smoothly, evenly, and sufficiently tight to retain dressings properly and give suitable support to broken bones.

It is desired to have all splints and dressings applied exactly as they would be if the hypothetical injuries were real. The only exceptions are that bandages and splints may be applied over the outer clothing, and that *tourniquets, when in position, will not be tightened sufficiently to interfere with circulation and cause pain.* The opening and application of dressings will be done aseptically. Care will be taken by medical officers observing the first-aid dressing that this requirement is strictly carried out. In case any dressing is not handled and applied aseptically, any observer will note the fact on the diagnosis tag, with the name, rank and organization of the enlisted man of the Medical Department at fault.

(*m*) Original diagnosis tags, filled out so far as the diagnosis is concerned, will be prepared in advance and issued from camp headquarters as required for the solution of problems.

The additional information required to complete the tags will be entered thereon by those handling the cases tagged.

Original and duplicate tags will be disposed of as required by Manual, Medical Department, 1916.

Lists of sick and wounded contemplated by Pars. 575, 576, 577, 579 and

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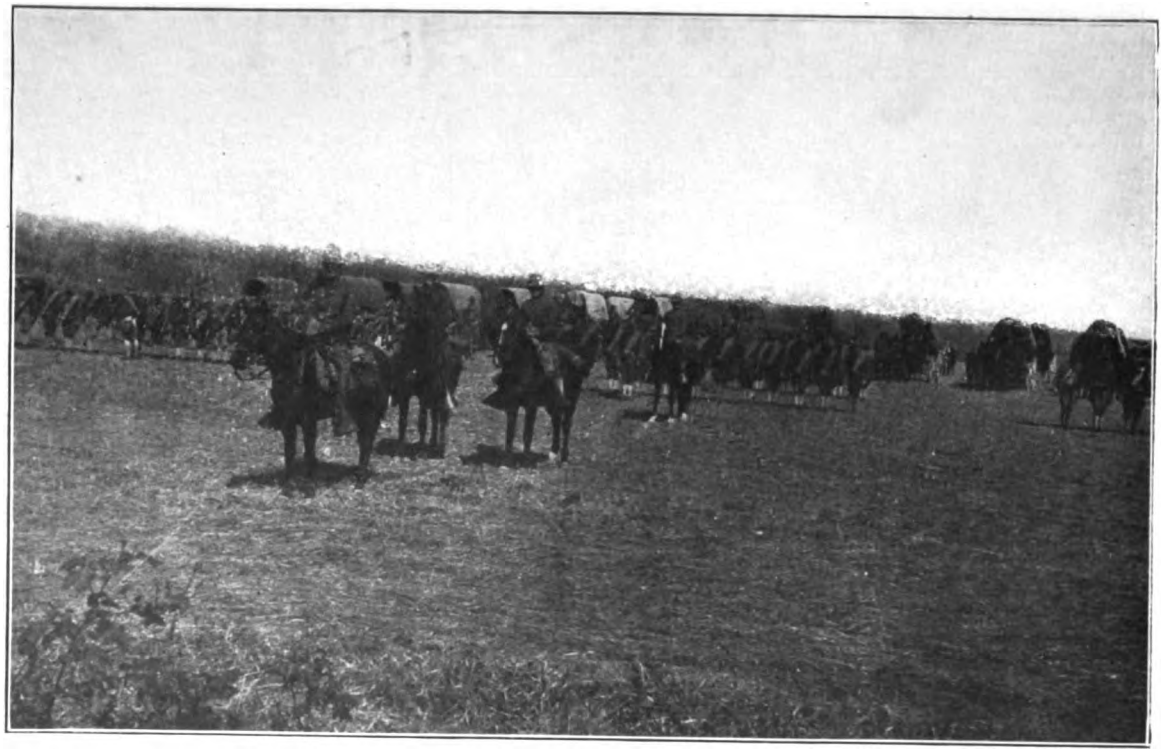

INSPECTION OF FOUR FIELD HOSPITAL COMPANIES.
(Companies in Line of Companies in Column of Platoons.)

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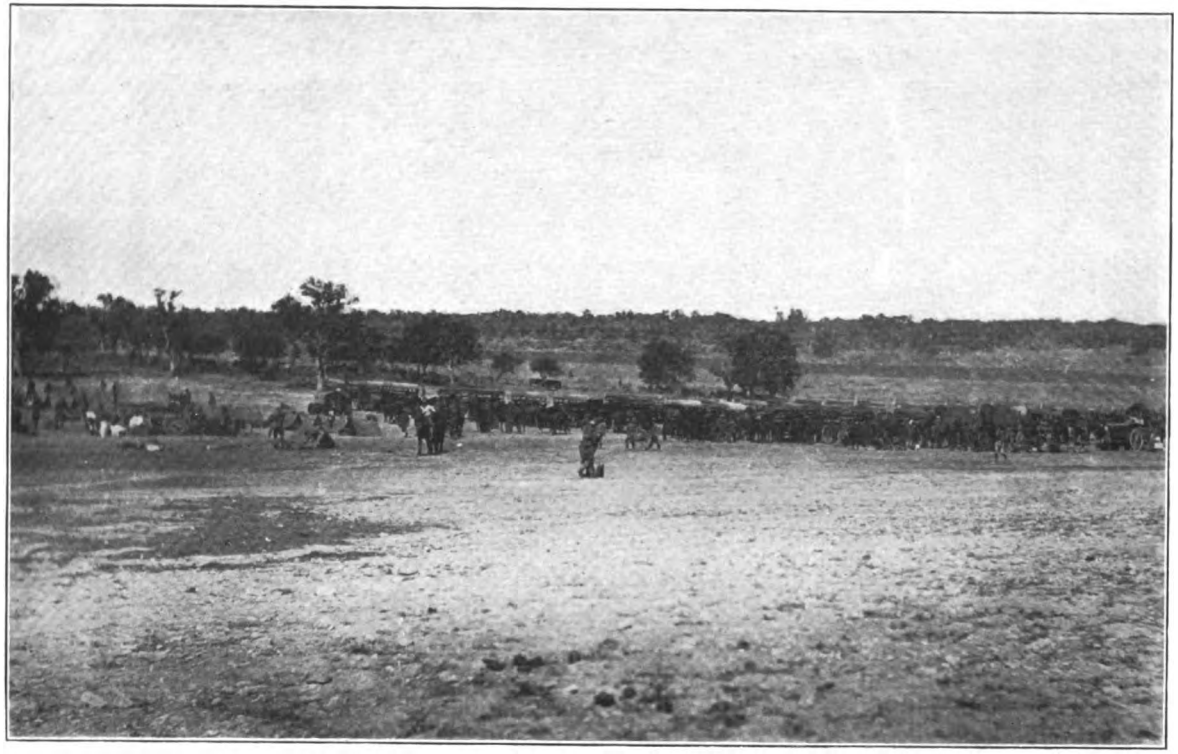

PARK OF FOUR AMBULANCE COMPANIES.

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586, Manual, Medical Department, 1916, will be prepared on Form 53, as part of the work required in the solution of problems.

Field Hospitals will make out transfer lists for all cases tagged with injuries appropriate for transfer to the line of communications, as required by Par. 588, Manual, Medical Department, 1916.

(*n*) Orders will issue daily, making assignments of personnel for the solution of problems. All other personnel, both officers and men, will be present at problems as observers. It is proposed to exchange, at frequent intervals, the sanitary personnel left at Camp Wilson for duty with that at Leon Springs, so that all may have opportunity to engage in the maneuvers. Likewise, temporary exchanges of duty will be made for purposes of instruction between the personnel of provisional regimental detachments and sanitary units.

Medical umpires will be assigned for each problem. They will be distinguished by wearing a white band around the hat.

(*o*) When recall sounds, all personnel, whether active or serving as "patients" will assemble as quickly as possible at the nearest point of medical relief, and report themselves by name to the medical officer in charge. A report will be made by each such officer giving the name, rank and organization of each "patient" who comes in without having been reached and given treatment.

(*p*) As the solution of each problem will ordinarily require one day, lunches will habitually be carried by all personnel. Filled canteens will be carried on all personnel. Filled canteens will be carried on all marches and maneuvers.

(*q*) Field Hospital Company No. 6, U. S., will establish and operate a camp infirmary, immobilizing the minimum amount of tentage, equipment and supplies.

(*r*) The Division Quartermaster will consult with Major Schindel and with the Division Surgeon with reference to supply of the troops while on the march and during the maneuvers, and will advise Depot Quartermaster of the measures necessary for the proper and orderly supply.

By command of Brigadier General Greene:

T. Ross,
Chief of Staff.

Official:

WAIT C. JOHNSON,
Captain and Adjutant, Twenty-sixth Infantry,
Assistant Adjutant.

The first night at Nine-Mile Hill was epochal in that for the first time four ambulance companies and four field hospitals were camped together. Here, Lieutenant Colonel Munson made some very pertinent remarks; among others, referring to the bad road formation of the first day's march, which, I may say parenthetically, bore fruit, in the splendid column shown the day following, and before finishing had all the officers "on their toes"—determined to give to the work of the coming week the best that was in them. His theory that we would all make mistakes and plenty of them, but that it was through our own mistakes that we would profit most, was altogether encouraging.

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This expedition was replete with hard work, both mental and physical, but it was not all work—it was a great game, and it had its amusing side lights, too. In one incident at Nine-Mile Hill the officer concerned is still waiting to determine whether he was really amused or not. The command was to move at 8.00 a. m., and before leaving the site was to be most carefully policed. Maj. Robert Pierson, the Division Sanitary Inspector, has a habit of following marching columns and seeing things no one else can see—at 7.50 the Commanding Officer of one of the units found himself with a large, deep kitchen fire-pit, filled with wet leaves and straw, rakings, kitchen slop, a few smoldering logs, and no small wood, or hay, or oil available. What to do? The pit couldn't be left, and the Commanding Officer knew from experience that the Division Sanitary Inspector also has a habit of digging about in covered-up kitchen fires. A new, clean, dry pit was quickly dug about 10 feet away from the old one, a few dry, neatly flattened and burned out tin cans were buried therein, the pit covered and the still smoldering logs placed thereon. The old pit was tamped down, covered with dry earth and planted over with grass and two cactus plants. Naturally the Commanding Officer was so pleased with himself over this performance that he must call Major Tuttle over to see it—very amusing! About five minutes later this Commanding Officer received a copy of a Headquarters Order stating that Major Tuttle had been appointed Sanitary Inspector for the expedition! The incident is written thus fully because it contains several valuable pointers for Sanitary Inspectors as well as Commanding Officers.

The Leon Springs Military Reservation is an ideal location for maneuvers—it contains about 20,000 acres, and is made up of hills, large and small, with numerous valleys; there are many roads, some good, some rocky and almost impassable, and there are many winding trails. Opportunity is offered for practically every kind of visibility, security and evacuation problem, for training in rough and smooth road work and location of stations and hospitals.

The exchange of officers and men in the various units for training in the different types of work is shown in the following memorandum:

HEADQUARTERS DETACHMENT OF TWELFTH PROVISIONAL DIVISION
LEON SPRINGS, TEX.

November 23, 1916.

Memorandum:

1. The Signal Corps will be at a point about 1,000 yards north of 24 at 9 a. m.; prepare to establish communication between Division Headquarters and First, Second and Third Brigades.

2. The following assignments of regimental sanitary personnel are made:

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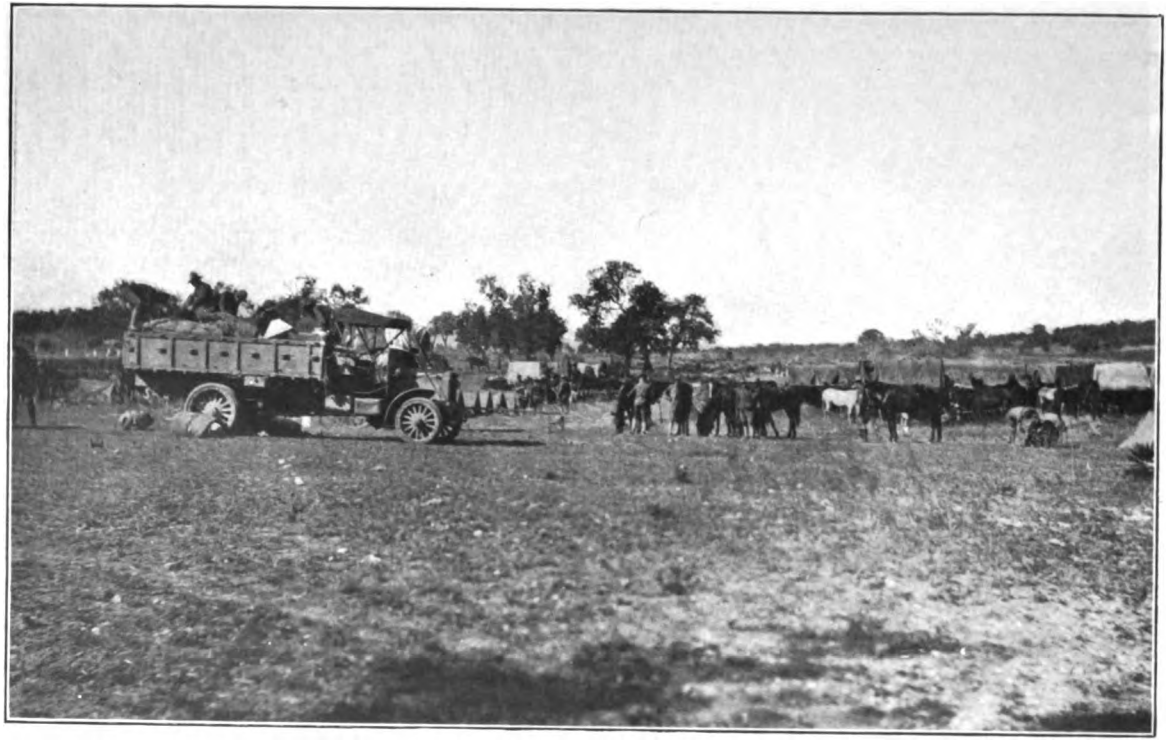

CAMP AT NINE MILE HILL.

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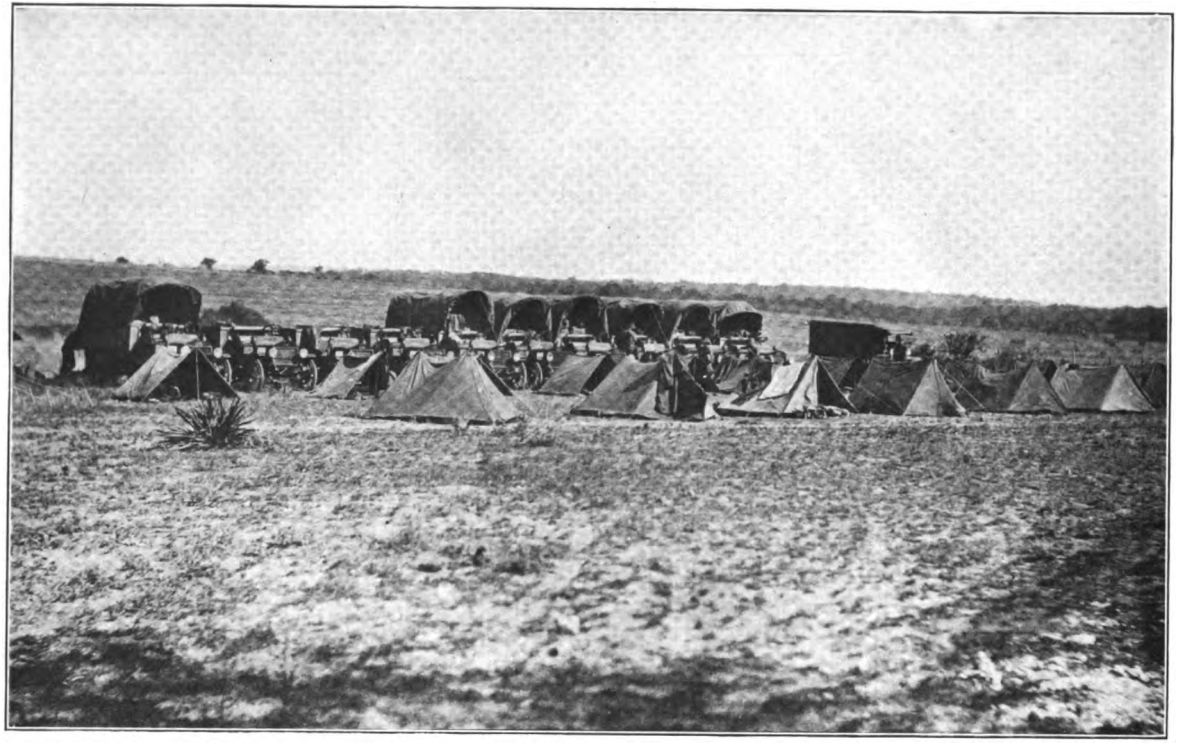

MOTORIZED FIELD HOSPITAL—BIVOUAC.

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First Regimental Detachment to the Third Infantry —Reserve First Brigade
Second Regimental Detachment to the Seventh Infantry—Divisional Reserve
Third Regimental Detachment to the Eighth Infantry —Divisional Reserve
Fourth Regimental Detachment to the Ninth Infantry —Divisional Reserve
Artillery Detachment to Second Field Artillery —Second Brigade

All of the above will be in position at 9.30 a. m. and await orders. (Location of combatant organizations have been specified in problems 1 and 2.)

3. Ambulance Company No. 1, Oklahoma, will be in position on the road to Blanco Road, with head at 19, amd await orders.

The dressing station section of Provisional Ambulance Company, Wisconsin, will be at Lewis Ranch and await orders.

Provisional Ambulance Company "B," U. S., will establish a dressing station and locate its train, on the sector of the First Brigade, as was done on November 22. There are hypothetical wounded (150) in that sector.

Ambulance Company No. 6, U. S., will take positions as corrected for November 23 for dressing station—north of 196—and train, less four ambulances —behind hill 197—and establish dressing station. It has 125 hypothetical wounded in its sector.

Provisional Ambulance Company No. 1, Wisconsin, will locate its train east of 201, as done on November 22. It has 75 hypothetical wounded in its sector.

All will be in position at 9.30 a. m.

4. Field Hospital Company No. 6, U. S., will establish at Well 7. It is receiving 200 hypothetical wounded.

Field Hospital Company No. 1, Wisconsin, will establish at Well 7. It is receiving 150 hypothetical wounded.

Field Hospital No. 1, Florida, and Field Hospital No. 1, Virginia, will be at 19, and await orders.

All will be in position at 9.30 a. m.

5. (*a*) Captain Jones, one noncommissioned officer and eight men from Ambulance Company No. 6, to Third Regimental Detachment.

(*b*) Lieutenant Clancy, one noncommissioned officer and eight men from Third Regimental Detachment to Ambulance Company No. 6.

(*c*) Major Dicks, one noncommissioned officer and eight men from Wisconsin Ambulance Company to First Regimental Detachment.

(*d*) Lieutenant Blumenthal, one noncommissioned officer and eight men from First Regimental Detachment to Wisconsin Ambulance Company.

(*e*) Lieutenant Mitten, one noncommissioned officer and eight men from Wisconsin Field Hospital to Second Regimental Detachment.

(*f*) Captain Lord, one noncommissioned officer and eight men from Second Regimental Detachment to Wisconsin Field Hospital.

(*g*) Captain Point, one noncommissioned officer and eight men from Fourth Regimental Detachment to the U. S. Field Hospital No. 6.

(*h*) Captain Austin, one noncommissioned officer and eight men from U. S. Field Hospital No. 6 to the Fourth Regimental Detachment.

(*i*) Lieutenant Parsons will exchange assignment with Lieutenant Hays, Fourth Regimental Detachment.

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6. Such number of patients as may be necessary will be drawn from the enlisted strength of the First Battalion, First Wisconsin Infantry.

They will be distributed under charge of Maj. Irving Fish, First Wisconsin Infantry.

7. Major Lanson is assigned as Divisional Surgeon.

Major Rogers is assigned as Divisional Ambulance Company Director.

Major Turck is assigned as Divisional Field Hospital Director.

8. All officers not named in this order, or assigned to duty with organizations named in paragraphs 3 and 4, will report at Headquarters as observers.

Headquarters will leave camp at 8.15 a. m.

9. All personnel engaged, officers and enlisted men, will carry lunches and filled canteens.

By order of Major Schindel:
(*Signed*) EDW. A. OLSEN,
First Lieutenant, First Wisconsin Infantry,
Adjutant.

The program of instruction included the solution of five medico-military problems; two terrain exercises; one practical exercise in map reading and orientation; one demonstration of field artillery field fire and lecture on the relation of artillery fire to the sanitary service; a march of 23 miles in two days, with bivouac; a march of 23 miles in one day; and the large amount of marching and practice in the establishment of aid stations, dressing stations, field hospitals, and stations for slightly wounded incident to the problem work. It included the dressing and transportation of hypothetical injuries on hundreds of soldiers serving as "patients," the writing and transmission of orders and messages, and daily demonstrations of the use of the Signal Corps in relation to the sanitary service. It also gave daily tactical demonstrations in relation to the location of trenches, supports, reserves, positions of commanders, use of roads, tactical use of infantry, cavalry and artillery, fields of fire, battle ranges, trajectories, slopes, combatant troop movements, and many other matters.

The first three problems were progressive, beginning with one reinforced brigade of the division in a planned defense, extending until the whole division was in action, and finishing with a complete divisional offensive. The first day's work was very ragged, but few officers or men had grasped the idea that they were each a part of the whole organization, that each unit was but a spoke in the wheel; the work was individual, and was, therefore, not coherent—the necessity for concerted action and for concise, specific and prompt messages and orders was not appreciated. It was all new, and the unexpected was always happening.

For instance, during the first day's work, a station for slightly wounded was established 3 miles in the rear of the trenches. Of over fifty men directed to this station, but seven reached it, and late in the

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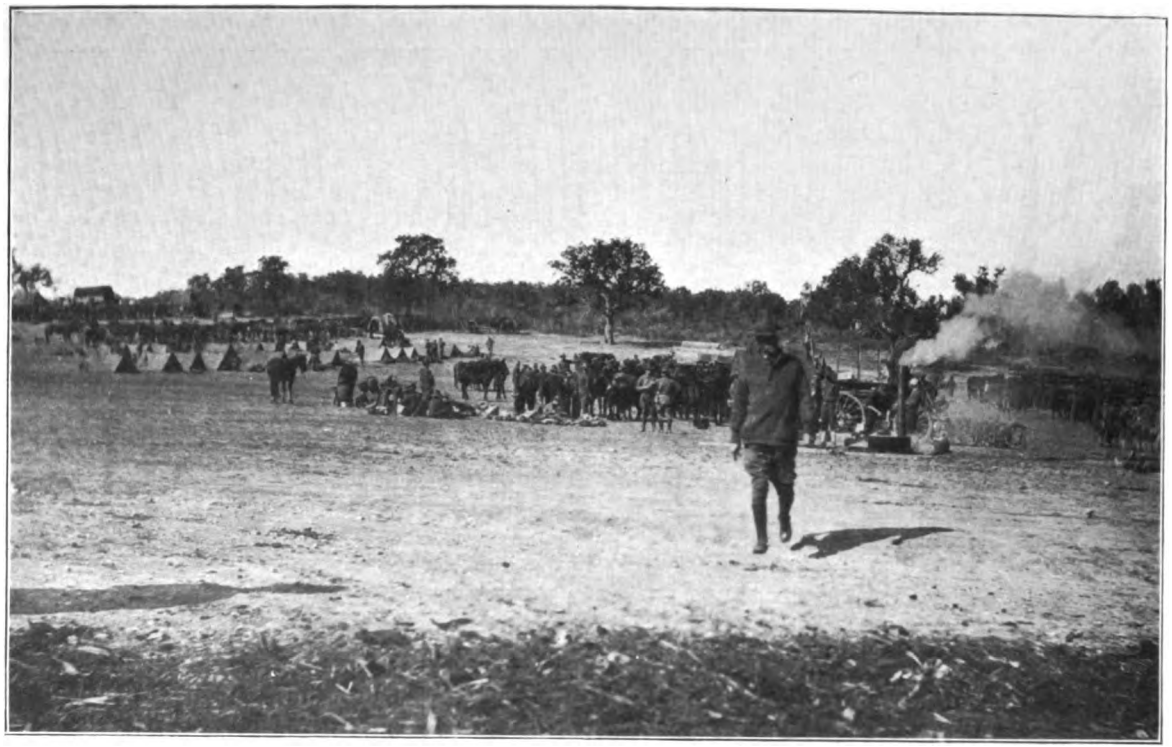

VIEW OF CAMP AT NINE MILE HILL.

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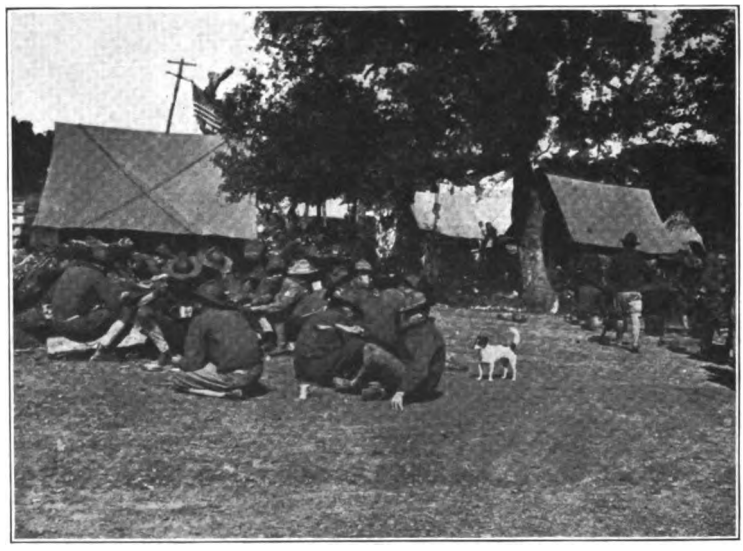
NOON MESS IN THE FIELD.



GROUP AT MESS IN CAMP AT LEON SPRING.

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afternoon twenty-two men—supposedly slightly wounded—were found aimlessly wandering in the hills and along the trails in the rear of the firing line—they had been ordered to the "station for slightly wounded about 2 miles, some place back over the hills." The manner in which the slightly wounded were handled in the last problem (the division in retreat) is indicative of the improvement in the work of the personnel, and of the team-work of the whole organization. This may, perhaps, be shown best by following the slightly wounded from one of the regimental aid stations back through the lines to the advance base. Upon receiving a message from the Division Surgeon ordering him to "abandon severely wounded in protected position with necessary sanitary personnel, retire with regiment, direct slightly wounded to collecting station road forks 150 yards east of Hill 124," the Regimental Surgeon (Major Rogers) lined up all his slightly wounded able to walk, rapidly inspected their dressings, asked first if there was a noncommissioned officer among them; there being none, he then asked if any one of them was familiar with the country; failing in this, he called for a hunter, woodsman, or man accustomed to finding his way about in strange places. One of the men stating that he had been a forester, the surgeon designated him as squad leader, and quickly but explicitly showed him on the map the position they were in, the roads, trails, hills and valleys between them and the collecting station. Visible hills and other landmarks were then located and their relation to the collecting station demonstrated. The men were directed specifically to proceed behind certain hills and to follow certain roads. This squad arrived at the collecting station promptly and without straggling. The slightly wounded from the other regiments came back in equally good order. The slightly wounded on arriving at the collecting station were taken in charge by the ambulance company men and allowed to rest. Loosened dressings were adjusted and the wounded were divided into two classes, (*a*) those able to proceed afoot, and (*b*) those exhausted by suffering, loss of blood, shock, or the walk back from the trenches.

The director of ambulance companies had received the following messages from the Division Surgeon:

"No. 3. Establish collecting station (temporary) at road forks 150 yards east of 124. Gather slightly wounded and direct them to slightly wounded station at Schasse Ranch."

(This order was exemplified verbally, the Division Surgeon stating that he meant the collecting station to consist only of a flag, a box of food, box of dressings and necessary personnel, and that the Director of Ambulance Companies was to see that the slightly wounded were sent to Schasse Ranch in an orderly manner, in charge of a hospital corps noncommissioned officer if necessary.)

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"No. 6. Send commissioned officer to combat wagons south of 124. Direct wagons to load with wounded at collecting station. Send suitable personnel with wagons. By order of Brigade Commander."

Both classes of slightly wounded were thus turned over, in an orderly manner, to the line of communications men at Schasse Ranch. Those requiring further transportation were theoretically taken in trucks—which had been sent up by the Surgeon, Advance Group—to the advance base; those able to walk still farther were sent in charge of a hospital corps man of the line of communication, to the railroad station at Leon Springs, thence by train to the base.

USE OF THE SIGNAL CORPS

These maneuvers have shown definitely that no sanitary problems based on the division, and but few brigade sanitary problems, can be handled permanently without the rapid and certain means of communication furnished by the signal corps. Distances are often great and mounted messengers slow and uncertain. The signal corps furnished for these maneuvers full organization for a division (one wire company and one wireless company, Missouri and Kansas National Guard) and the buzzer, telephone, field wireless and night flash were all used to transmit medico-military messages. In spite of this great assistance, it took hours to get the medico-military machine into operation. The problems could hardly have been worked without the signal corps assistance. In one problem, in which two brigade sector problems are linked up to form a division problem, an area of about 20 square miles was handled by the Division Surgeon through the signal corps and messengers.

After each day's work a meeting was held by the officer detailed as Division Surgeon for the day, at which the problem as a whole, the work of each unit and each officer, each message and order and the reason therefor was discussed in detail. Lieutenant Colonel Munson, with Major Frew, would then criticize the work, point out errors and emphasize opportunities for improvement. Major Schindel's discussions of the tactical situations and of the medico-military work from the line officer's viewpoint were highly interesting and instructive. After the first day's work, and after the first day's meeting, the whole atmosphere cleared, everyone seemed to get a broader grasp of what a Divisional Sanitary Organization meant, and one could almost hear the divisional unit shake itself together. The work was better, smoother, and more efficiently done from day to day.

In doing the third day's problem the field hospitals made a record which seems worthy of special mention—three of the field hospitals (wagon transportation) were lying in reserve at "20," the fourth having been immobilized with 300 patients. At 12.25 p. m. the Director of

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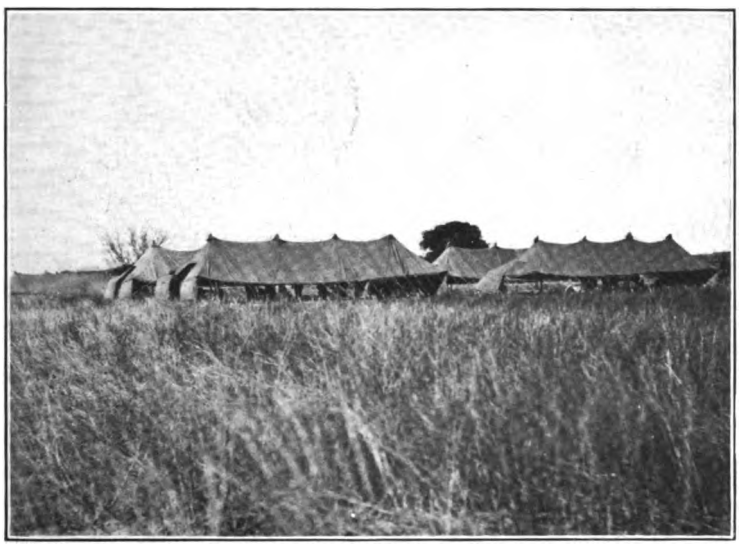
LOADING AMBULANCE—NOTE SPLINTS AND DRESSING.



THREE FIELD HOSPITALS PITCHED AT SCHASSE RANCH.

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GROUP AT REGIMENTAL AID STATION.

MEDICAL OFFICERS OBSERVING ARTILLERY FIRE.

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Field Hospitals received an order to move three mobile hospitals to point "3," 3½ miles away, and await orders. At 12.29 p. m. the three hospitals were in motion. At 1.30 p. m. the Director arrived at "3," received orders to estabish at Schasse Ranch, rode on to lay out hospital and select buildings to care for 1,000 patients. At 1.50 p. m. the three hospitals arrived at Schasse Ranch; at 2.12 p. m. a message was sent to the Division Surgeon that the hospitals were ready to begin receiving patients, with offices, records, kitchens, food, fires, hot water, operating rooms, and with enough tentage pitched and beds laid down to clear one full ambulance company. A total of one hour and forty-seven minutes to move 4 miles—2 miles being over rocky, hilly roads—and set up ready for patients.

As one day's work this seems most satisfactory, but the men after their 4-mile march (having marched 5 miles previously that day) and after their strenuous speedy work in setting up the hospitals, unloading patients and distributing them, were tired; presuming that they must work all night caring for wounded—would they make the same record the day following? And how would they do the third day? It seems unchallengable that all field hospital men should be transported so that they may arrive at their destination fresh and ready for fast work, and that, with their heavy equipment and tentage, field hospitals should operate at full war strength, and that for hard field service day and night more men are needed.

Problem No. 4, the evacuation of the battle field at night, was most instructive; it involved the evacuation of 244 patients from a brigade front of 1½ miles, 2 miles back to the field hospitals. These men were all actually tagged, located in the darkness, properly bandaged and actually transported. The work was completed between 7.00 and 11.30 p. m.

The following are but a few of the observations made:

1. The regimental personnel is inadequate—fifty enlisted men the minimum number necessary.

2. Regimental sanitary troops should be provided with lights for night dressings and search for wounded. A small, oval electric flash-light of size to fit pocket of the new belt is recommended. Batteries to be carried in medical and surgical chest or in pack mule box, and issued only when needed for night work. First Lieut. L. A. Greene suggests a small head light to burn signal oil, such as is used by hunters for fire hunting.

3. A greater number of dressings, particularly shell wound dressings, should be carried to the firing line or trenches by the regimental detachments. A box of food—carried with the additional dressings by a

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second pack mule—seems advisable, since frequently wounded must be left at the aid stations until nightfall.

4. The ambulance service is inadequate, both as to time element and in carrying capacity. Recommend that at least three of the four present ambulance companies be motor mounted, that one company (animal and wagon transportation) be added to the division, and that the present war strength of each company be increased by four sergeants and forty privates.

5. Provision should be made for transportation of all ambulance company personnel. Pack mules to be led by mounted men. Much time will be saved.

6. It is believed that the field of usefulness of the dressing station will be limited to not over 20 per cent of engagements. If the dressing station is located close up to the firing line it is no better than an aid station, except that some food is carried; if it is located well back, then it is impossible to transport wounded to it by litter on account of distance of carry—one 1,000-yard trip exhausts a litter squad—and because of danger of both direct and indirect fire. It is beleved 80 per cent of the evacuation of severely wounded will be done at night, direct from aid stations to field hospitals, thus eliminating the need for an intermediate station.

It is recommended:

(*a*) That one in every three mule-drawn ambulances carry a travois, or wheeled litter (horse-power).

(*b*) That one in every three motor ambulances carry a wheeled litter (man power).

7. The divisional station for slightly wounded is usually located too far in the rear. It should always be ahead of the field hospitals.

8. A "secondary line of sanitary relief" is recommended; a line of collecting stations, when typical dressing stations are not used, composed ordinarily of nothing more than a flag, a box of dressings and a few hospital corps men, should be located at road forks, on roads along which troops have moved to the front, or in protected spots in rear of firing line or trenches as needed, to gather up slightly wounded and send them in charge of competent guides back to slightly wounded stations, field hospitals, combat wagons, line of communication transport, or to evacuation points. The present dressing station sections of the ambulance companies should provide personnel and equipment for these stations.

9. Some time is lost through requiring commanding officers of ambulance companies to make records of patients transported. Inasmuch as wounded have diagnosis tags giving all information, the commanding officer of ambulance company on arriving at an aid station, in conjunc-

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FIELD HOSPITAL ON ROAD.

SANITARY ORGANIZATIONS IN COLUMN.

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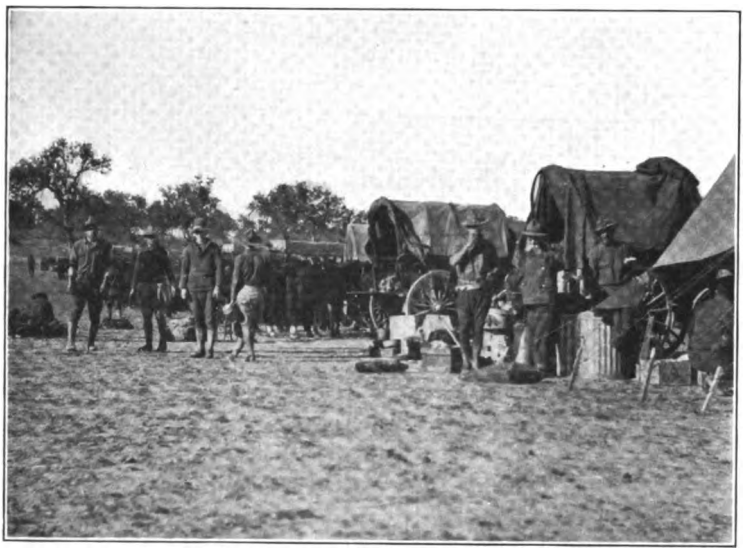

AMBULANCE COMPANY—BIVOUAC.

FIELD HOSPITAL RECEIVING WOUNDED.

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tion with the Regimental Surgeon, could quickly estimate number of wounded requiring transportation—recumbent and sitting—send up necessary ambulances, load rapidly without wasting time in holding each patient long enough to fill in records. At present wounded can be loaded only one at a time. No wounded will be lost from the ambulances during transport, and necessary records can be taken after arrival at the field hospital.

10. All field hospital men should be mounted or transported. Men cannot make long or forced marches, and then pitch heavy tentage, handle heavy equipment, and perhaps work all night, for any length of time. They should arrive at the designated point for pitching hospital fresh and ready for fast work. Three of the four field hospitals should be motor mounted.

11. A kitchen wagon (trailer or cart) is recommended, also that each field hospital wagon or truck carry a water cask or tank to hold 10 or 20 gallons, so that in an emergency the hospital might pitch with sufficient water for operating room and liquid food, if not near a water supply.

12. More care should be exercised in advising the directors of field hospitals and ambulance companies, and surgeon, and commanding officers of isolated units, whenever headquarters is moved, and to point to which moved.

13. Regimental surgeons, in advising division surgeon of wounded requiring transportation, should state number requiring transport recumbent, and number requiring transport sitting. Economy in ambulances will result.

14. It is recommended that enlisted men of the Medical Department designated as orderlies be specially trained in equitation and the carrying of messages.

IDENTIFICATION OF SANITARY WAGON TRAINS

15. "At the present time there is nothing to distinguish the wagons of a field hospital as such, or secure such neutral immunity for them as the Geneva convention theoretically affords. These wagons are indentical in appearance to those used by combatants for ammunition and supplies. They bear no Red Cross insignia, nor is one carried by the field hospital company on the march. The maroon guidon of the field hospital company affords no more protection than a cavalry or artillery guidon, nor does the inconspicuous lettering on the wagons, which one must be within a few yards to read. Only when a field hospital is pitched does it display any insignia of neutrality. A field hospital train on the road would appear to any hostile observer, on the ground or in the air, like an ordinary combat or supply train, and would promptly

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draw fire as such at even the shortest of ranges. The same applies to the three wagons of the ambulance company, which have, however, a certain advantage in being associated with an ambulance column whose character might be recognized by observers. The ambulances themselves are deficient in identification emblems. Each supposedly carries a Red Cross guidon, which is often torn or broken off, especially in wooded country. Also, this guidon is so small that it cannot be readily seen at artillery ranges; it is on the right side and not readily apparent from the left flank, and it droops so as to become invisible in the absence of considerable wind.

"Either this sanitary transportation should be made as invisible as possible, and thereby take its chances with combatant transportation, or it should be much more conspicuously marked. The latter is recommended.

"It is, therefore, suggested:

"1. That ambulance guidons with staffs be done away with.

"2. That sufficient guidons, with tapes, but without staffs, be supplied to ambulance companies to serve as markers only. It is hardly conceivable that there should be any circumstances in which material for staffs could not be found locally. The guidons could be attached by tapes to sticks, trees, fences, etc., for use as markers.

"3. That every sanitary wagon and every ambulance be supplied with a detachable strip of white canvas, not less than 40 inches wide, bearing three 'Red Crosses,' each not less than 30 inches in dimensions. This canvas strip should be long enough to go over the top of the ambulance and button or lash down at the seat level. For wagons it should go over the tilt and lash at the level of the wagon bed. Each canvas strip, when in such position, should show a Red Cross on top of the vehicle so as to readily identify this transport to aviators, and on each side to identify it to artillery or other observers. No lesser means of identification will suffice." (Lieutenant Colonel Munson.)

15. "From a tactical standpoint, field hospitals should at times be as invisible as possible, although the identity of their trains should be as clear as possible at all times. They can be made more invisible by streaking the present canvas with appropriate colors to blend with environment. A base of khaki streaked with green and dirty white would blend with the landscape in most places except in winter. This protective coloration could be increased in efficiency by adding branches, grass, etc." (Lieutenant Colonel Munson.)

In conclusion it is but fair to state that the sanitary troops set a mark for the line troops to shoot at, in marching in from Leon Springs, 23 miles in nine hours, and coming into camp in close column, no straggling, heads up, on the step, 100 yards a minute.

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THE EFFECT OF MARCHING ON THE RATES FOR NON-EFFICIENCY OF NEWLY RAISED TROOPS

By Lieut. Col. EDWARD L. MUNSON

Medical Corps, United States Army, Division Surgeon, Twelfth Provisional Division

(With four illustrations)

ON September 16, 1916, the Twelfth Provisional Division, stationed at Camp Wilson, Fort Sam Houston, Tex., started on a practice march to Austin, Tex., and return, a distance of 165 miles. The division reached Camp Wilson again on October 2, a detached brigade returning on October 3. All the troops engaged were Militia, which had been on the border an average of about two months, except a newly formed regiment of regular cavalry and a similar one of field artillery, and two Regular Ambulance Companies (one provisional), and one (motorized) Regular Field Hospital.

The preliminary training of these troops had included a certain amount of marching as regiments and brigades, but for no great distances and for no more than two days at a time.

The troops participating included 9 regiments of infantry, 2 of field artillery, 1 of cavalry, 2 companies of engineers, 3 companies of signal corps, 4 ambulance companies and 4 field hospitals. There were, in all, 13,994 officers and men, and 5,664 animals listed to participate. Late additions increased these numbers slightly.

The distances marched, in miles, were as follows:

	Day of march																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Division ..... Miles	*9.5	*15.5	8	14	14	11	11	7	†	†	†	7	11	11	13	*16	*17	—
Reinforced Brigade .... "	15	16	‡	...	...	...	...	...	...	...	...	...	...	...	...	14	15	15

*Less reinforced brigade. †In camp at Austin. ‡Maneuver.

The distance marched by the division, less reinforced brigade, was 165 miles; by reinforced brigade, 174 miles. The division had fourteen days of actual marching; the reinforced brigade, fifteen days.

The weather during the march could hardly have been better. Most of the mornings were overcast, with a cool, fresh breeze. On the return trip, a cool "norther" blew for three days.

The only rain occurred while the troops were in camp at Austin. There was never any mud. Most of the roads marched over were

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metalled and there was no great amount of dust. The marches were neither hard, long, rapid nor over rough country. The packs were not heavy and there was no water shortage. No environmental factor existed to cause undue physical breakdown of the command. Whatever such factors there were, were intrinsic within the individual. They represented physical defect or were psychologic. It is possible, through the graphic charts, to get a very clear insight into the degree to which this factor of physical deficiency operated. The graphic charts which have been maintained for each regiment and separate organization in the Southern Department during the mobilization, show many things relative to the health conditions and causes of inefficiency in such commands. The amount and incidence of disease and injury, and its distribution among the company organizations of a regiment, are, through them, apparent at a glance. So, too, disease of an infectious nature, by which the development of a possible epidemic may be anticipated and forestalled. A careful study of these charts will also indicate the underlying physical causes affecting the rise and fall of disability rates. A sudden rise would call for special investigation, as possibly due to ptomaine poisoning, or it might be from heat exhaustion, from chilling and exposure to cold, from the extra hazard in the mounted service with new men or new animals, or it might be due to the direct effect of marching, on poorly selected or unseasoned troops. The latter point will be treated of in this paper. The amount of disability in a marching command is an expression of the care with which troops were selected, the efficiency of their training and the thoroughness with which unfits were eliminated prior to beginning the march. In some organizations of this division, attention had been paid to all these factors; in others, to one or more only. In none did these factors obtain in like degree. The results, accordingly attained, are both diverse and important.

The beginning of the march was promptly followed by a general rise in the curves of the graphic charts for the admissions to sick report throughout the division as a whole. In some regiments this rise was less than in others; in some it was more delayed; mounted troops showed much less march effect than foot troops; better disciplined regiments showed less inefficiency; regiments made up of probably more carefully selected men, or better exercised in marching, showed lower rates; regiments from which the unfit were weeded out before the march showed a smaller march rise. All this is what might be expected. In a general way, it represents presumptive conditions heretofore tacitly recognized. But the amount and distribution of the inefficiency resulting from marching had probably not previously

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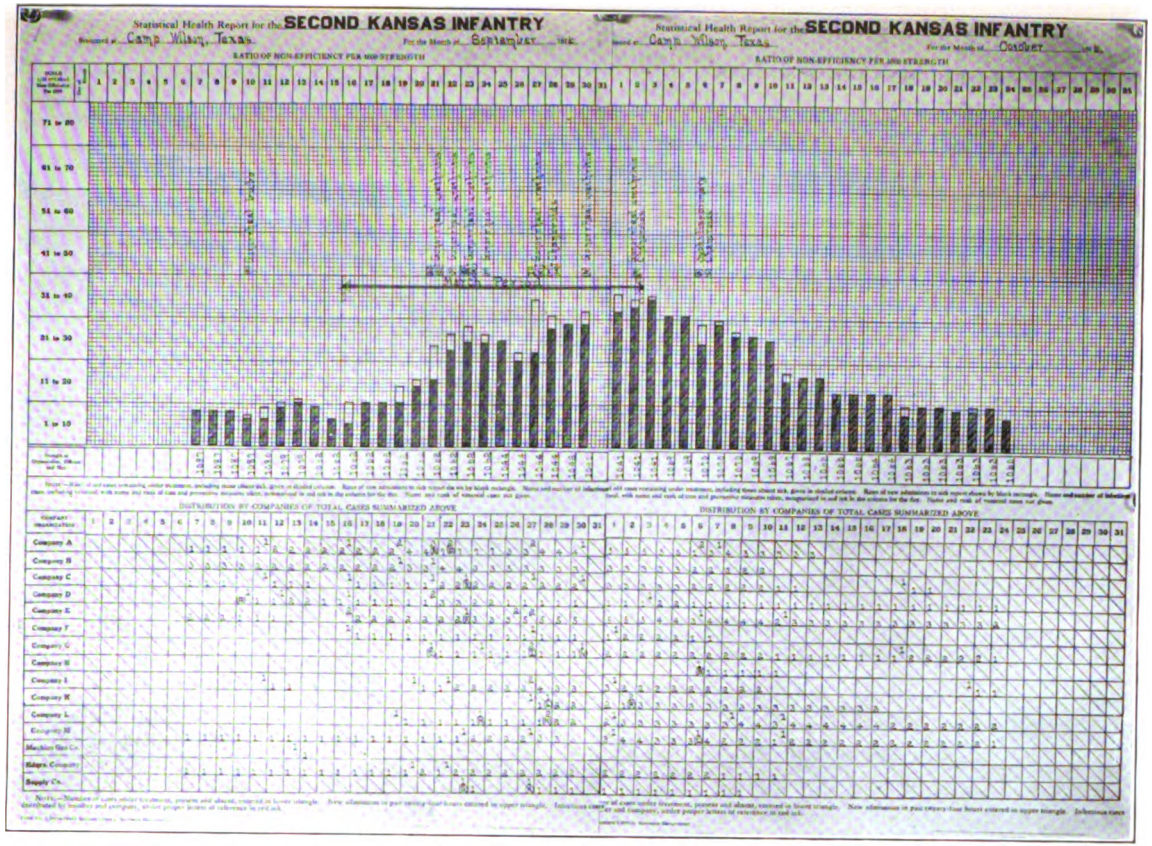

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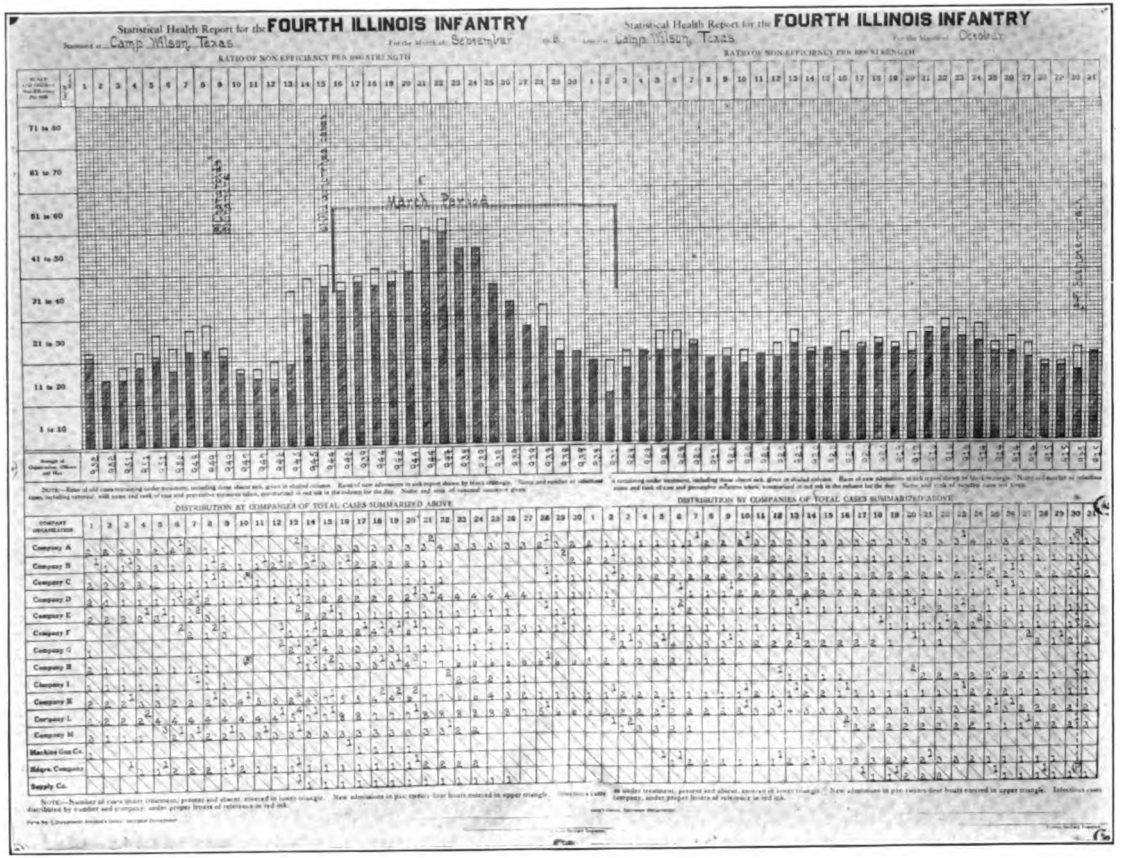

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been reduced to mathematical exactness and expressed so as to be understood at a glance. The charts transfer accepted hypotheses into demonstrated facts.

These points can best be appreciated by examination and comparison of a few typical regimental graphic charts, each based upon a body of men sufficiently large to reduce to a negligible quantity the margin of error and all representing organizations serving under the same military conditions and thus having comparable standards. Several such charts, with brief analysis thereof, are herewith presented.

The non-efficiency record of the 2d Kansas Infantry, as influenced by marching, is typical. This regiment reached San Antonio on September 7, from previous station at Eagle Pass. It left Camp Wilson on October 24, for its home for muster out. Its non-efficiency rate prior to the day of the march was about 9 per 1,000, which was considerably lower than the average for the camp as a whole. A fortnight after the march was over its rate was 13 per 1,000, and a few days later had fallen to 10 per 1,000.

But in the meantime its rate had risen to a maximum of 36 per 1,000. This maximum rate was reached practically at the end of the march. This chart shows a rather uniform progressive rise from the beginning of the march to its end, and an equally regular and progressive fall back to the regimental normal after the march was over and its disabilities had been cleared up under treatment. It will be noted that the greatest number of new cases admitted to sick report was on September 27, which was the day on which the command started on the return march from Austin. During the march period, thirteen venereal cases, all understood to be of old standing, were detected and placed on sick report, and these probably accounted for more than a third of the regimental disability. This chart gives little evidence of effort to go over the regiment thoroughly and weed out the unfit prior to the march. It shows that no new cases came on sick report on September 14 and 15; and but five on September 16, the day of beginning the march, none of these being venereal, which began to figure almost daily in the admissions beginning September 21. On the twenty-first, twenty-second and twenty-third a total of new cases aggregating a ratio of about 14.5 per 1,000 were admitted to sick report, and these had to be sent back 50 to 75 miles to the base. It is believed that a more thorough going over of the regiment about September 15, would have resulted in the detection and elimination of very many of these and other cases later shown unfit to march. That this regiment had some twenty-five men in the ranks, leaving for Austin, that never should have started on the march, and that later served merely

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as an encumbrance, annoyance and inducement to straggling, is very clearly shown by the graphic chart.

The disability was fairly evenly distributed throughout the regiment, except that Companies "A" and "B" had more than their share, while Company "H" had no admissions whatever during the entire march. Such differences between companies as are here noted were common to practically all regiments. There were sick companies and well companies, companies that could march without developing disabilities and others that could not, companies that would go for a month or six weeks without a man absent from duty, and companies that would have 10 or 15 or more per cent on sick report. The difference is the difference between diverse standards of discipline, of selection, and of mental outlook.

The Eighth Illinois Infantry is a colored regiment throughout. Its graphic chart from September 1 to October 6, when it left Camp Wilson for its home station for muster out, is herewith. Its average camp non-efficiency rate before the march was about 20 per 1,000, which was well above the average for the division as a whole. The number of new cases admitted to sick report just prior to the march was so small as to indicate that no systematic "weeding out" of the regiment was carried out, especially when the tremendous rise in non-efficiency rates during the march is also taken into account. This regiment showed a steady progressive increase in disability for every day the march lasted, rising from an average of about 20 per 1,000 before the start to 59 per 1,000 on the last day of the march. The conclusion seems logical that this regiment had on the march in the neighborhood of 30 men or so who never should have been allowed to start. Further examination of the cases found unfit showed that many of them should never have been enlisted.

Preliminary examination would have done much to anticipate and prevent such a high degree of march inefficiency. There were, for example, fifteen cases of venereal disease that had apparently been concealed and first came under observation during the march. There was wide variation in the non-efficiency rates of the companies of this regiment. Company "I" never had a man on sick report throughout the march. Company "C" before the march had four men on sick report, but these were returned to duty by September 23 and there were no more admissions. A similar good record existed in Company "K." On the other hand, Company "F" began the march with none sick and on September 29 had ten. Company "G" jumped from four to ten and Company "H" from zero to six. Venereal disease and poor physical selection and poor discipline accounted for the differences.

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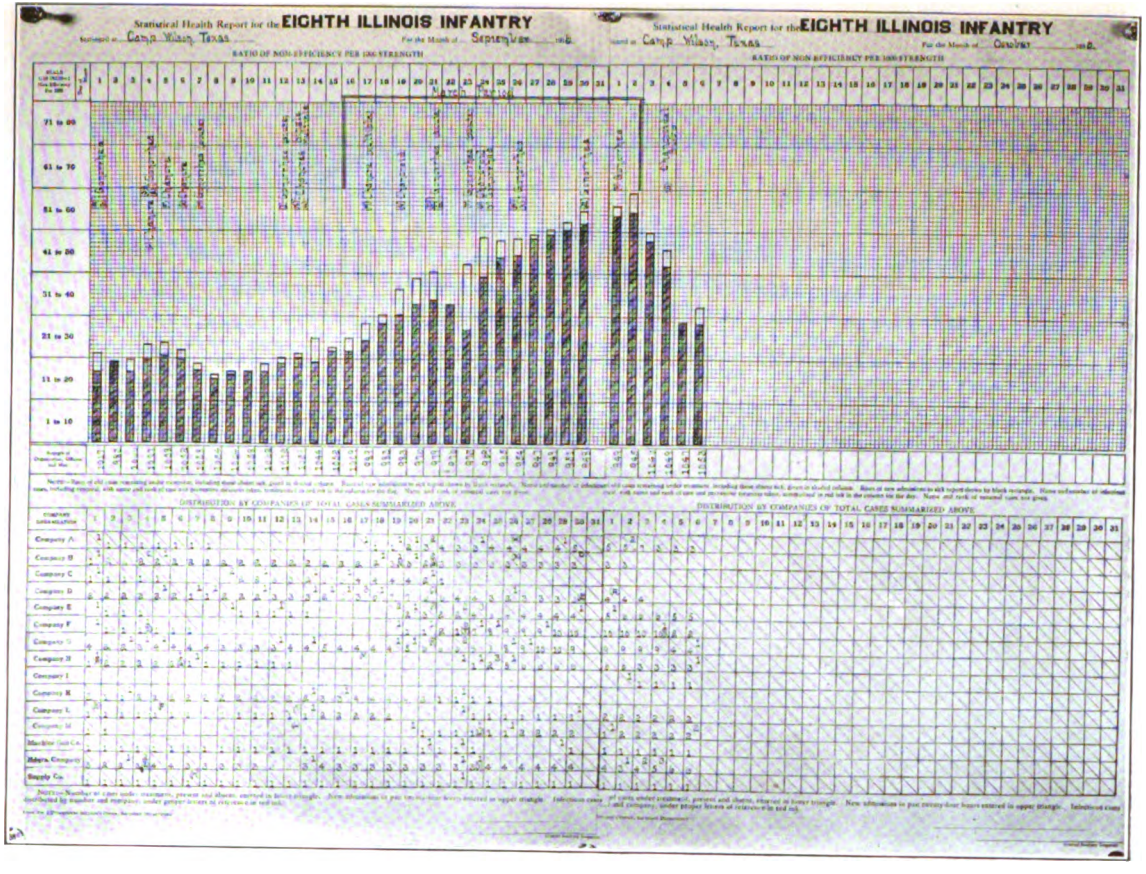
Statistical Health Report for the EIGHTH ILLINOIS INFANTRY
Statistical Health Report for the EIGHTH ILLINOIS INFANTRY

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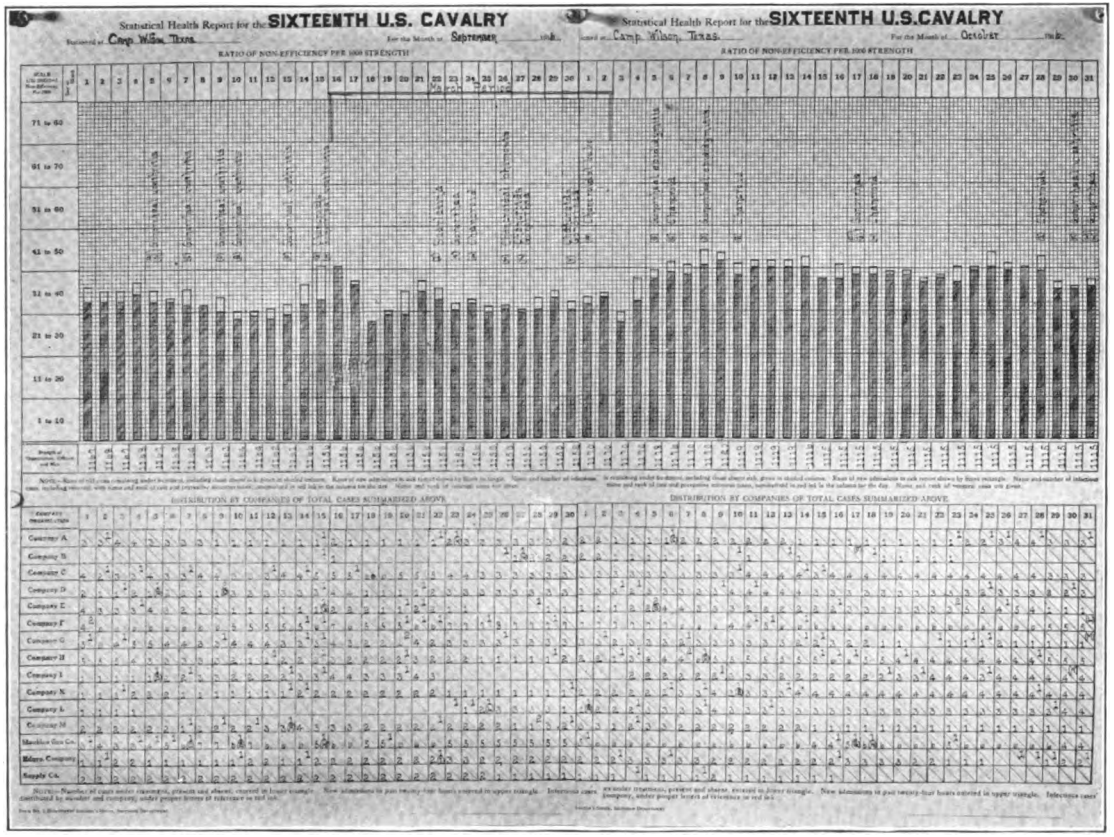

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There was much straggling from this regiment during the first few days of the march. Much of it was due to psychologic causes and poor discipline. But the chart shows very definitely that this regiment started on the march under a high physical handicap.

The chart of the 4th Illinois Infantry is of much interest, and its curve should particularly be compared with that for the 8th Illinois Infantry. Evidently a very decided effort was made to prepare this regiment for marching through previous elimination of the unfit. In the three days prior to the march, twenty-nine men were taken up on sick report, giving a daily admission average far in excess of the previous normal for this regiment. The result was that the regiment started on the march with a relatively higher inefficiency rate than in most other regiments. But during the march this regiment had proportionately much fewer admissions, and practically all these came in the first week of marching. In other words, the regimental unfits were sought out and left behind when the regiment moved out, as they should be, and the transportation service of the Medical Department was relieved of the necessity for their later evacuation.

It will be noted from the chart that there was a most rapid fall in disability rates after the twenty-third of September, and that the regiment at the conclusion of the march had practically no increase of the sick report over what had existed a couple of days before the march began. It will further be observed that this regiment went for a number of days in the last part of the march without a single case appearing on sick report. The regiment, through elimination of its weaklings, was thus able as a unit to meet the existing march stress without losses.

The attached chart of the 16th Cavalry shows the great difference in the effect of marching on mounted men as compared with foot troops. Here the characteristic march rise of infantry is absent. Cavalrymen are not burden carriers and hence their organisms are not put under any unfamiliar mechanical stress on leaving camp for the march. The horse furnishes the means of locomotion and removes the difficulties under which the infantry soldier labors in the mechanics of marching. The numerous admissions to sick report in this regiment on September 14 and 15 indicate effort to eliminate the unfits prior to marching. That this bore fruit was evidenced by the fact that the rate shown by the graphic chart during the march was practically not in excess of the rate existing prior thereto, there being almost no admissions while en route except for venereal and furuncles.

After the regiment returned to Camp Wilson the rate almost immediately rose by about 10 per 1,000 more than existed during the march. This chart also illustrates the greater hazard in the mounted service.

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It will be noted that the ratio for this regiment is about twice that of the camp normal and three times more than for some infantry regiments. This being a newly formed regiment, it had a large number of recruits to break in and a complete outfit of untrained horses to handle. The combination resulted in a high disability rate for accident and injury. Also this regiment had an unusually high incidence of venereal disease.

The class of disease and injury in this regiment was such as to keep the cases on sick report a relatively long time, which would keep the curve high. Although the rate as a whole was high, its analysis showed that, other than venereal, its component factors had no special sanitary significance. A study of the distribution of cases by companies shows no very active movement of sick; in fact many of the company sick reports show very little change over long periods.

Nonefficiency rates depend not only on number of cases but also upon their gravity. In this instance, gravity and persistence of disability are the dominating factor. A few fracture cases, or venereals requiring prolonged treatment, will go far towards maintaining a high inefficiency rate, though this rate may be accompanied by relatively few admissions.

The chart of the 7th Field Artillery gives a march curve almost identical with that for the 16th Cavalry.

Mounted commands suffer relatively little under the stresses of marching. It is the animal which has to bear the burden and upon which the real strain comes.

To the number of unfits, whose presence is so demonstrable by the graphic charts, must be added a further quota from those left behind at Camp Wilson as a guard for property. There were two enlisted men from each company so left behind, or thirty to the regiment. It is a matter of common knowledge that many men were picked as members of this property and camp guard because they were not thought to be physically capable of standing the march. The graphic charts therefore represent an understatement of marching inefficiency, under march conditions so easy as really not to constitute a test of campaign efficiency.

The charts indicate that foot troops require particularly careful examination before being allowed to participate in campaign, and that they must be examined very carefully as to their probable fitness as burden carriers. This includes freedom from disease, muscular development, condition of feet and general physical stamina. Many men are able to do all duties about camp who cannot stand up under the daily stresses of burden carrying. Such men often wish to march and their commanders are anxious to have them. Medical officers tend to give them the benefit of the doubt and let them try it. But such a

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policy is a mistake. In case of any doubt, the Government should have the benefit, otherwise the sanitary service will later be called upon to handle a large amount of work that should have been unnecessary, and strain be put on transportation facilities chiefly intended for other purposes.

In the mounted service, much of this does not apply. The mounted man is himself a burden and not a burden carrier. Weak feet, poor physique or slight ailment do not necessarily disqualify for ordinary campaign conditions. The horse is the transportation agent. Here men may be allowed to campaign who should be rigorously held back if they belonged to the dismounted, burden-carrying branches of the Army.

The average disability rates of the militia in this division while in camp have run lower than those for the regulars. This is due to several facts. Most of the regulars are mounted, and most of the militia are foot troops. In marching, the foot troops' rate is higher, but in camp routine it is lower. Also a very great reason why the militia rates are apparently lower is due to the concealment of such disability—especially venereal diseases—among them, while the regular troops search it out and place it on sick report. That this concealment of the unfit is a fact is evidenced by the great march rise of disability in many regiments, whose defectives had previously been given special duty or were not placed under conditions calculated to test out their physical capacity. The march revealed a large number of cases of venereal disease not on sick report.

Too many of these new troops were found to be physically substandard in one or more respects, doubtless in some cases through the haste with which they were physically examined before entry into the service. In a number of cases it has been surprising that such defectives as were found to have been enlisted were able to pass the examination. Experience during this march has been that these men tended to break down early, even under the slight stress of relatively easy marching. Also that the march served a most valuable purpose in bringing these substandards to light. How much these defectives broke down is apparent from the number of discharges from this division on surgeon's certificate of disability accomplished at the Base Hospital for the period including September 16, the day the march started, to October 30, the end of the month in which the march was concluded. There were many such discharges for disability accomplished before this period—also many subsequent to it. But the 122 discharges given during this special period are of particular interest, as they are practically based on the defectives brought to light by the march through

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their physical inability to accomplish it. Without such a march, and under the routine of camp, many of these substandards would have been able to continue to conceal the fact that they were unfit to go to war. A summary of these discharges from this division, September 16 to October 30, follows:

Adhesions, abdominal, chronic, 1; amblyopia, 2; ankylosis, partial, shoulder, 1; appendicitis, chronic, 1; arthritis, gonorrheal, 19; arthritis, rheumatic, 1; asthenopia, result of strabismus, 1; asthma, 2; cholecystitis, 1; dementia praecox, 2; endocarditis, chronic, 1; enuresis, 1; epilepsy, 2; flat feet, 21; hammer toes, severe, 1; heart disease, organic, 3; hernia, inguinal, 27; hydrocele, chronic, 1; hysteria, chronic, 1; iritis, chronic, 1; locomotor ataxia, 1; malformation of toes, 2; nasal polyps, 1. Old injury: fracture, humerus, 2; loss of eye, 1; painful scar, right hand, 1; dislocation, both shoulders, 1; otitis media, 5; otitis media, sinusitis, rhinitis, 1; paralysis, nerves below waist, 1; pes cavus, 1; pyorrhea alveolaris, 1; psychopathic state, constitutional, 1; stricture of urethra, 1; syphilitic arthritis, chronic, 1; syphilis, 2; trachoma, 2; tuberculosis, pulmonary, chronic, 1; undescended testis, 1; urethritis, gonorrhael, 4; varicose veins, 1; total, 122.

In the militia, the tendency seems to have been to hold all "border line" cases to service, doubtless due to difficulty in recruiting and failure to recognize the fact that, however well such substandards would fill the ranks in peace, they would merely prove to be an incumbrance when the time came to march in war.

This tendency seems to have been encouraged in the hasty effort to get some men promptly on the border for service, as it is understood that in some instances instructions were to waive all minor defects. Such general authority gives play to individual opinion not qualified to pass on this important matter, and lets the bars down so that substandards of even lower class than was officially contemplated are allowed to enter. The march was a great object lesson in this respect. Numerous medical officers after the march voluntarily expressed themselves to the effect that one of the greatest lessons they had learned was that any soldier who had a blemish was unfit for service. Before a march, there is probably a certain amount of self-elimination from the ranks by the unfit, who realize their marching deficiencies and bring them to the attention of the surgeon, perhaps for the first time. On the other hand, there are many who are unfit to undertake the march, yet who conceal their disabilities. This applies particularly to venereal diseases, of which the militia troops sent comparatively few cases to hospital, keeping them under treatment in the regimental infirmaries and often without official record of conditions. There is a third class,

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which is entirely fit physically to make the march, but which, for one reason or another, desires to evade it. All these classes must be borne in mind. But it is absolutely certain that if the weeding out of these unfits is not done in advance, the vicissitudes of the march will automatically do it later. Naturally, the harder the march, the fewer are able to stand up under it and the greater the number are physically forced to elimination. This condition should be anticipated, and strain on the evacuation service thereby avoided. This is more than a rough task. It should be an intelligent and comprehensive effort to weigh the probable marching capacity of the soldier—with its component factors of mind, body and training—against the difficulties of the march task imposed upon him.

During the march there were 389 cases sent back from the marching column to the Base Hospital at San Antonio. Very few of these cases were of an acute nature or of recent development. They represented, as a class, old defects that the march brought out and accentuated. Of these, about 25 per cent were venereal, and about 50 per cent were cases with foot troubles and other physical defects which should never have been enlisted. If these had been culled out prior to the march, the service of the Medical Department would have been reduced to a small fraction of what was actually required of it. Many of them were included in the discharges previously summarized in this paper. It may be thought that the disability rates given on the charts for this march might vary to a certain extent with the individual equation of the regimental medical officers. While this might happen in camp, it could not happen for the march period under consideration. All men who were reported as fit to march had to march, and did so. All men sent from regiments to a field hospital were passed upon by a board of two medical officers as to their fitness for hospital treatment. All men invalided back to the base had first to be favorably passed upon by another board of three medical officers. So far, then, as this is possible, the graphic charts for the march represent actual physical nonefficiency without a variable factor in the regimental medical officer.

Foot soreness was not a great factor in nonefficiency. There was relatively little of it of a serious nature. Practically not a man was sent back to the base from this cause on the march to Austin, and only a few on the last day or so of the return, when it was easier to send them in at once by motor ambulances than to carry them along in the sanitary trains. There were comparatively few sore feet in the command, and most of these, after washing and strapping, did not prevent marching. Very careful attention was given the feet by all concerned. The result was the prevention of all but a very small amount of foot injury. The

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surgeon of one regiment reported that the men of his command, over 1,300 strong, reached Camp Wilson at the end of the march without a sore foot in the organization.

The amount of straggling on the march to Austin was very considerable. On the return march there was much less. Most of it was unnecessary. At the time of leaving Austin, most of the unfits had been weeded out and sent back to the base. The greater proportion of the straggling was due to psychic causes and poor company discipline. Only a few of these stragglers, after the first few days, appeared on sick report and therefore did not figure in the graphic charts. They made their way to camp at their own pace and rejoined their companies. They were voluntary stragglers, by preference and not of necessity. There were, of course, sound physical reasons for straggling by the men unfit to march, and for their transportation to camp. The task was too great for them. But the effect of their straggling was not limited to the "unfits" themselves—it had a most marked psychologic depressant effect upon others of good physique but low will power. Upon this last class, the example set by stragglers is very pernicious. They are very easily influenced and are highly imitative. They respond quickly to the suggestion of example. The sight along the road of a straggler weakling, who should never have been enlisted, crystallizes out and magnifies their own discomforts, diminishes initiative and discipline and causes them to fall out, even though physically quite capable of continuing with their organization.

The 389 men actually evacuated back to Fort Sam Houston were naturally practically all, at one time or another, representatives of the straggler class. A few of these substandards falling out from leading regiments and waiting in the shade for the ambulance train to come up, could, and doubtless did, seriously disturb the morals of the entire division as it marched by. Repetition of such examples in successive organizations naturally increased the totals toward the rear of the command, with proportionally increased psychic effect upon the regiments near the tail of the column. It was noticed, in this connection, as a matter of observation, that straggling was, in fact, less from the leading regiments than from others. This was apparently due not to any special march or road conditions or heat, but to increased psychic depression through seeing more stragglers. All this is an argument for better selection of recruits. It is also an argument for having at least one ambulance follow immediately after each regiment to pick up its stragglers and thereby prevent their cumulative depressant effect upon the successive regiments following. The Twelfth Provisional Division had such regimental ambulance service in its march, but its unfits were

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so many as to overtax it and leave a large surplus to be transported by the ambulance companies. The inability of some to march furnishes the unconscious psychic stimulus of others to be unwilling to march. All this is also a further argument for more systematic training to stiffen the will power of the soldier in the attainment of the military object. The actual physical inability of some to march furnishes to the able an unconscious psychic stimulus to be unwilling to march through impression of inability to accomplish it. And the man who fears or believes that he cannot accomplish a task has already been defeated in advance.

It has already been mentioned that this march was made under the very best marching conditions. It was not a test of military efficiency but merely an effort to train raw organizations in the rudiments of easy route marching. Its hardest parts did not represent even the minimum requirements of ordinary campaign. Yet many of the participants thought it a most difficult ordeal—and the increased physical abilities which it demanded over camp life brought a shower of cases on sick report. Had the weather been hot, the marches been longer or the command encountered rain, the inefficiency curves would have gone much higher than they did. That they went as high as they did is a cause for serious reflection as to the marching ability and physical fitness of many individuals of the organizations concerned. As it was, some of these organizations broke badly. A slight increase in the difficulties of the march, not to say an approximation of war conditions, would have caused them to lose cohesion and cease to possess fighting efficiency. So far as this march itself is concerned, it seems demonstrable that each regiment had, at least, thirty to fifty men who were physical substandards and unable to make what may fairly be regarded as easy marches, and who acted as a drag on the whole. Had the march standards required been one of actual war conditions, it is probably safe to say that the number of ineffectives disclosed would have doubled the above estimates.

Some final conclusions resulting from this march would seem to be, for the organizations participating therein, as follows:

(*a*) Physical standards are allowed to fall too low in many cases. There should be sufficient time on mustering to properly go over the men and exclude all unfits. The same standards which are required in the regular army should be adhered to in militia organizations.

(*b*) After enlistment, all substandards should be specifically looked for at the first opportunity, and discharged at once on certificate of disability if there is proper reason to believe that they will fail to accomplish the requirements of military service.

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(*c*) There should be more training in marching, both for physical development and mental assurance. No troops like the idea of marching; too often personal preference is allowed to outweigh the technically desirable. At present, our troops are most valuable for sedentary warfare. Marches should be frequent, they should be progressive, they should ultimately be long and comparable to those under campaign conditions. Troops should spend one-half their time, at least, in the field. When an organization takes the field, either all should go, or the men left behind as camp guard be physically fit. To select the weaklings for such detail gives a false idea of regimental marching and campaign efficiency, and delays the elimination of the unfits from the service.

All should be required to march, for the march is one of the very best tests to determine physical fitness for war. It will shake out men whose unfitness would otherwise be concealed.

(*d*) Greater care in making physical inspections is required to detect concealed disease. At these inspections, the unfits should constantly be looked for with a view to elimination.

(*e*) Several days before any extended marching, troops should be thoroughly gone over by medical officers, with the special purpose of holding out, for treatment or discharge, all men whose ability to carry out the march is in question.

MEDICAL AND SANITARY HISTORY OF THE FOURTH ILLINOIS INFANTRY STATIONED AT CAMP WILSON, TEXAS, SEPTEMBER AND OCTOBER, 1916

Arrived at Camp Wilson from Leon Springs, Tex., September 1, and departed for Austin, September 16.

Record March to Austin and Return

Camps	September													October	
	16	17	18	19	20	21	22	23		27	28	29	30	1	2
	Wetmore	Comal	Lands Park	Hunter	Blanco River	Buda	St. Elmo	Camp Mabry	RETURN	St. Elmo	Buda	Blanco River	Hunter	Comal	Camp Wilson
Distance marched, miles.....	9.5	12.	8.	10.5	12.5	12.4	12.	07.		7.	12.	12.4	12.5	18.5	21.5

Forty-nine venereal cases were found on inspection, October 29. Company A, 4; B, 1; C, 4, D, 1; E, 1; F, 4; G, 8; H, 3; I, 4; K, 4; L,6; M5; of which three were transferred to the Base Hospital. On September 10, chancroids were found in Company C, and chancres in Company H. Cases of chronic gonorrhea were sent to the Base Hospital in anticipation of the practice march.

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THE SANITATION OF PUBLIC BUILDINGS

By Passed Assistant Surgeon J. R. HURLEY
United States Public Health Service

SINCE the promulgation of Executive Order No. 1498 of March 15, 1912, the Government buildings in the District of Columbia, excepting those of the War and Navy Departments, have been regularly inspected, with reference to their hygiene and sanitation, by officers of the Public Health Service.

The conditions found in a number of the Government buildings were, and still are, unique. Some of the structures now occupied as office buildings were erected upwards of a half-century ago for residential and other purposes, at a period when hygiene and sanitation as we understand these today were unknown. Inasmuch as such buildings are inherently poorly adapted for their present use, much difficulty as well as expense is encountered in the attempt to render them thoroughly sanitary. The Government still occupies quite a number of rented buildings in Washington, so any large expenditure of funds requisite to put them in a modern sanitary condition is, under the circumstances, hardly warranted. Several new Government buildings are projected or in course of construction, which, when finished and occupied will give relief from the objectionable features now found in some of the rented ones.

The modern steel frame office building of the familiar skyscraper type seen in large cities today is usually so constructed as to fulfill all requirements, from the standpoint of sanitation and perfect hygiene, for the persons housed therein. The interior arrangement and finish of these buildings is of such a nature as to be easily cleaned and kept clean. This is in marked contrast to a number of the older Government buildings, though some of the new buildings and one or two of the Government's rented modern office buildings, compare favorably with anything in the country.

Government buildings are peculiar in that many different processes and activities are carried on within them, other than purely clerical work. They are, therefore, objects of special interest to the public on account of these activities. Certain buildings are much frequented by organized parties of sightseers, as well as individual visitors. These are in addition to the large number of callers daily having business with the Government or some of its officials. Hence the wear and tear on floors of corridors, rooms and stairs is much greater than would obtain in an ordinary city office building Special provision has to be made for

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these visitors in the shape of sanitary drinking cups, and water supply, also toilet facilities. They carry into the building a certain amount of mud and dirt, and use the cuspidors—or expectorate promiscuously—all of which throws an added amount of work on the cleaning force of the building. These various matters have to be taken into consideration in judging conditions as they are found to exist.

Custodians have invariably afforded every coöperation possible to the inspecting officers and manifested a desire to correct all defects pointed out within the limits of available appropriations.

At the time of making an inspection to determine the hygienic and sanitary conditions existing in the building, the following matters are given consideration: Ventilation, heating, lighting, drinking water supply, toilets and lavatories, dressing rooms and clothes lockers, general order and office furniture, overcrowding and congestion, welfare of employes, vermin and insects, cleaning methods and general cleanliness, and miscellaneous, comprising any other matters tending to affect the health and welfare of the employes.

For convenience they will be considered in this article in the order above mentioned.

VENTILATION

In those buildings having modern mechanical systems for ventilation, this question is generally satisfactorily solved. That is, where the system is of the combined plenum and exhaust type, in which the incoming fresh air is humidified and heated or cooled before being driven throughout the building. It has been found that occasionally, for reasons of economy, but one part of such a system will be kept in operation (either the exhaust or the plenum) with consequent impairment in the ventilation. In the majority of the buildings, where no such system exists, recommendations are made looking toward the free utilization of natural sources of ventilation, such as the installation of an adequate number of glass wind shields or air deflectors slanting inward from window sills. These allow of windows being raised at the bottom during cold weather, avoiding at the same time direct drafts upon the employes The regulation of opening wide all windows for five minutes during the mid-forenoon and afternoon period, the employes meanwhile stirring around, is advocated, and has now been pretty generally adopted throughout the large offices.

Electric fans are quite generally in use in the various offices during hot weather as an aid to ventilation and cooling A larger number of small, low-powered desk fans might be found more suitable in many instances, rather than fewer, high-powered ones located on wall brackets

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about the rooms, such as are generally in use. The latter generate too strong a draft ofttimes for the workers in direct line with them, whereas the former could be tilted or run at a speed to suit the convenience of the person occupying the desk. The total electric current consumed would probably be no greater.

Desk screens or other barricades that interfere with free ventilation are condemned, and swinging doors that occupy but the middle third of doorways leading into offices are advocated, as tending to promote a free circulation of air throughout the building.

HEATING

Most of the buildings are now heated by steam, though in some, antiquated hot water and hot air systems are still in use. It is seldom that the amount of heat furnished is found inadequate, the prevalent defect being a relatively low humidity in the atmosphere. An economic waste from excessive fuel consumption results from the latter condition, for, as is well known, a considerably higher temperature is necessary for comfort under conditions of low humidity, than when the dry and wet bulb readings are 70° and 65°, respectively, or at a relative humidity of about 76°. Save in those buildings having mechanical ventilating systems whereby the air is humidified previous to distribution throughout the building, this matter is difficult of correction without opening wide the windows and unduly cooling the rooms. Temperatures of 78° and 80° F. have been observed in large tightly closed office rooms in the winter time, and yet no one complained of the heat; the occupants had become accustomed to it and on account of the dryness of the atmosphere did not feel too warm.

As a matter affecting general cleanliness wherever the old fashioned type of steam radiators which sit flat on the floor—thus favoring an accumulation of dirt under them—are encountered, recommendations are made looking toward their removal and the substituting therefor of a type standing well off the floor which permits easy cleaning of the space beneath. For the same reason they should not stand too close to the wall.

LIGHTING

The importance of this subject as affecting well-being and efficiency is yearly becoming more apparent. To discuss lighting in detail is beyond the scope of this paper.

The prevailing type of electrical installation in Government buildings is a fixture or drop cord swung from the ceiling and supplied with tungsten bulbs and Holophane reflectors. While these are in the

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majority of instances sufficient to light up the room, they are not infrequently found to be unsuited to the purpose of properly illuminating the work that is being carried on under them. They cause glare in some instances and several distinct shadows in others. This is trying to the eyes of the workers, and tends to produce eye strain, possibly even visual defect, with consequent lowered efficiency.

The mercury vapor tube lamp attached to the ceiling, is in use in certain work rooms where large scale mechanical processes are carried on. While these produce a steady, powerful illumination at low cost they are not free from glare, and, owing to the practical absence of red rays in the light, they cause an unnatural greenish cast to people's countenances, as well as to other white objects, and are not considered ideal for these reasons.

The indirect or semi-indirect form of electric lighting is the most satisfactory method of illumination that we have today. While more foot-candles in lighting units per square foot of floor area to be illumined are required, if properly installed there is but little if any increased cost for electric current over the direct system. The diffuse, restful light produced by this type of illumination more nearly approximates natural day light in its effects than in any other system heretofore devised. In its freedom from glare and distinct shadows it is very satisfactory to work by. There are two or three Government buildings which now have this form of lighting, and the day will come when all the others will have to give this matter due consideration. At present on account of the expense involved in transforming lighting systems, recommendations are chiefly directed toward preventing undue glare by the use of proper shades, and installing lighting units at places where adequate illumination is most needed.

It is not infrequently found that the light from natural sources of illumination is unduly impaired or interfered with by reason of dirty windows. Sometimes natural lighting in a wide room or in a basement, can be greatly improved by substituting for ordinary window glass, ribbed or prismatic glass which will refract the oblique rays of light. Painting opposite brick walls white to reflect what light enters narrow courts may be found a useful expedient. Awnings over windows are of great benefit in reducing glare in the summer time, and they also help in keeping an office cool.

The color of ceilings and walls and the condition of same are also given attention, as these affect the illumination. Suggestions regarding the tinting or the color of paint to be used are frequently given, it being the aim to avoid dark colors and choose a tint that will be agreeable to the eye and at the same time neither absorb nor reflect too much light.

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Buff, or pale yellow, or pale shades of green are, generally speaking, the most suitable colors for office walls, in combination with cream colored ceilings. Paint is the preferable wall coating as it can be washed. It should be so applied as to not have a glossy finish when dry. White paint is trying to the eyes. It may be required in a naturally dark room, but it should have a flat or stippled surface.

Recommendations such as the above, though simple, are often welcome, and when carried into effect result in an improvement of the existing conditions.

DRINKING WATER SUPPLY

A chilled water is furnished in all buildings for drinking purposes, and numerous devices are use for cooling and storing same for use.

It might be of interest to describe and comment upon the common types. They all aim to provide water cooled to taste without permitting contamination to occur. In so far as they do this without allowing ice to come into direct contact with the water are they successful, and as they further rule out the liability of contamination of the water by human hands do they more nearly approach perfection.

A common type in use is the up-ended large, bottle cooler, the neck of which rests in a bed of cracked ice, the water being delivered by a self-closing valve. Here the water is protected from the ice, but the bottle is open to contamination at the time of washing and refilling.

In another system in common use the water is chilled and stored in a large tank generally located in the basement under control of the engineers. The entry of water from the mains is regulated by a float attached to the intake valve. The water is cooled by ammonia coils located within the tank, and is circulated throughout the building by a small steam or electric motor-driven circulating pump. In some the return water enters the sewers, but more generally it returns to the tank and is recirculated Where care and intelligence (two hard things to secure) are used in connection with this system, it is satisfactory. Its defect is that the cooling tank becomes dirty with an accumulation of sediment in the bottom after a time and has to be cleaned out, during which process there is danger of infecting the tank, should the laborer happen to be a typhoid bacillus carrier. The manhole door in the top of the tank should, invariably, be padlocked and the key intrusted only to a responsible party with instructions not to allow same to be opened save for purposes of cleaning. The writer chanced to see the result of violation of this rule. During the course of an inspection of a certain building, the basement was reached during the noon hour. While standing near the cooled water tank a soiled fireman was seen to enter the room, who proceeded to lift the manhole top off the tank and, by

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means of a cord, draw up a bottle of milk, dripping and cold, which he had had suspended in the general water supply. Such a condition is not pleasant to contemplate, and that the effects were not disastrous was because, fortunately, the fireman did not happen to be a typhoid bacillus carrier.

Another system provides that water directly from the mains circulates through coils located in the bottom of a tank containing ice. It is delivered to the consumer either by a spigot or a bubbling fountain outlet. Here the water cannot be contaminated by either ice or hands. Small tanks such as these can be installed in the rooms or corridors of nearly any building and are entirely satisfactory, save that their appearance and the amount of space they take up may sometimes be an objection.

The most satisfactory type of all is in use in some of the Government's newest buildings, in which the water cooling and delivery system was planned in advance and installed in the building during its construction. The water, as it enters the building, passes through coils connected directly with the mains and is cooled by the ammonia process. This cooling plant is generally located in the basement, and the water is circulated throughout the building by the natural head or pressure in the mains, and is delivered to the consumer at fonts of the bubbling type located at convenient points about the building.

At present, all Government employes are furnished with an individual drinking glass, and regulations have been issued where by the leaving of these at water coolers for common use is prohibited. By the extension of the bubbling type of drinking fountain, the need for either the glasses or the regulations would be done away with.

TOILETS AND LAVATORIES

As a rule it may be stated that the toilet rooms and lavatories have been found entirely satisfactory as regards plumbing, ventilation and general cleanliness. On the basis of twenty-five persons as a maximum per toilet seat, instances are occasionally encountered where the facilities provided are inadequate for the number of persons using same. The following sanitary conveniences are recommended: hot water, liquid soap, and paper towels in all lavatories, and the abolition of all cakes of hand soap. These arrangements are now pretty generally in use.

Roller towels and other towels intended for use by more than one person were abolished in all Federal buildings by Executive Order of September 30, 1913. All employes are now furnished with a clean individual towel at least once a week.

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DRESSING ROOMS AND CLOTHES LOCKERS

Adequate dressing room and clothes locker facilities will be found in only a few and those of the newer Government buildings Where employes do arduous physical work the need of a proper place in which to change their garments is obvious, and there should likewise be provided a hot room for drying their clothes when wet with sweat. Shower baths are also practically a necessity. Clothes lockers of a sanitary type should be provided not only for those who do manual work but for all employes, so that they will have a proper place in which to hang their hats and wraps. The conditions formerly existing in the Government buildings in this respect were very bad. Hats and wraps were hung anywhere about the offices and work rooms, contributing to unsightliness and disorders. A few buildings had a number of old fashioned wardrobes and wooden clothes lockers. These stood flat on the floor rendering proper cleaning difficult and they were almost invariably infested with roaches and other vermin attracted by the articles of food stored therein, and likewise afforded a favorable opportunity for the interchange of ectoparasites.

Recommendations are made looking toward the abolition of wardrobes and wooden clothes lockers wherever found, substituting therefor metal clothes lockers one for each employe. These lockers should be louvred at top and bottom to facilitate ventilation, and located in a convenient dressing room especially set aside for that purpose.

It is requisite that regulations be issued prohibiting the keeping of foodstuffs, or accumulating junk, in these lockers to avoid attracting insects or other vermin. It will require at least a monthly inspection by some one in authority to keep this regulation in force.

GENERAL ORDERLINESS AND OFFICE FURNITURE

Orderliness promotes easy cleaning, and disorder breeds dirt, dust and disease. Furthermore, one cannot help thinking that disorderly surroundings are an indication of, if they do not actually contribute to, a slovenly and inefficient mode of carrying on the business of the office. The installation of metal clothes lockers is a large step towards order; hats, wraps, etc., are then kept out of offices and work rooms

Good order depends largely upon the cooperation of all employes. They should keep only such papers and records on their desks as are necessary for the work in hand, same to be returned to the files rooms promptly when finished with. The piling up of books, records and other documents on desks, table tops and filing cases should be avoided, and especially should such matter be kept off the floor. The cleaning force cannot be expected to handle these articles, especially in view of

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the fact that should any record become misplaced or lost they will then be blamed.

All unnecessary pictures and other adornments on office walls should be prohibited, as these tend to promote disorder, accumulate dust and render proper cleaning troublesome and difficult.

Office furniture of the sanitary type, which stands several inches from the floor, is an important factor in good sanitation. Cleaning is facilitated, and there is avoided that condition almost invariably found under the old fashioned type of desks. These being too heavy to be easily moved permit a thick layer of dust and dirt to accumulate beneath them, which sometimes remains for months or even years.

There still is a good deal of old fashioned furniture in use in Government offices. However, all new furniture now being purchased is of the sanitary type, and the old pieces will be replaced by it as fast as practicable.

OVERCROWDING AND CONGESTION

This is a condition not infrequently encountered. It has been of a constant and gradual growth parallel with the expansion of the Government. This expansion has been at a rapid rate in recent years, coincident with additional duties and activities imposed through Congressional enactments. The personnel has been increased at a more rapid rate than additional space has been provided. Pending the construction of new buildings, every effort possible is being made to mitigate this condition, by promoting adequate ventilation and by other measures calculated to protect the health of the employes.

The congestion of floor and air space by cumbersome cabinets and filing cases, which but add to the objectionable features of overcrowding, has been largely done away with in recent years. This was accomplished by relegating these pieces of furniture to files rooms or basements, or, in many instances by their complete removal, substituting for them smaller pieces of modern, sanitary design.

WELFARE OF EMPLOYES

Under this heading may be mentioned lunch rooms for employes and rest rooms for women. The lunch rooms vary from simply a small, poorly lighted room where employes may bring and eat their lunches, to a full-fledged restaurant where any ordinary dish may be secured. These restaurants are almost invariably of the cafeteria type. Some are run as coöperative affairs by the employes, while others are operated by outside parties as a concession. Such institutions are to be commended and encouraged as they promote not only health and content-

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ment among the employes, but also are of importance from an economic standpoint.

Practically all Government buildings, where any considerable number of women are employed, have now fitted up a women's rest room. In some instances this is but a room furnished with easy chairs; in others there are beds, and a matron who is a "practical nurse" is in attendance. The intention being in the latter instances to give first aid only until a physician can arrive and the patient be removed to her home.

In this connection it might be stated that in the majority of buildings some arrangement is in vogue for furnishing sanitary napkins to those desiring same. These are supplied by the rest room matrons, by the maids in charge of toilet rooms, or by cabinets of the slot machine type located in dressing rooms and toilets. Besides being a convenience, this provision saves the loss to the Government of large numbers of linen towels annually.

Under this heading, also, should be mentioned the dispensaries or small emergency hospitals which have been fitted up in those buildings where large scale mechanical processes are carried on, in which accidents or injuries to workmen are liable to occur. First aid only is contemplated, though some minor complaints of a more or less chronic nature, such as eye and ear affections, that would render an employe less efficient or keep him away from his work, are given treatment by the physicians in charge of these dispensaries.

VERMIN AND INSECTS

A few years ago, several of the buildings were badly infested with rats. Following intelligent directions regarding rat proofing, given by the inspecting officers, these rodents have been shut out and no longer constitute a nuisance. Mice are not infrequently found, located, generally, in the files rooms or in store rooms, where they chew up the available paper in making their nests. The following out of suitable instructions results in a disappearance of these vermin, as they do not burrow, gnaw, or travel in any way commensurate with their big cousins the rats.

Roaches may be said to constitute an almost universal pest in this climate. Proper inside construction and the avoidance of exposing food stuffs to their incursions, goes a long way in discouraging their introduction and maintenance in a building. Where opposite conditions prevail, a constant fight is required to keep them down and their total eradication is almost impossible. Some custodians have contracts with a roach exterminating firm to keep their buildings free of these insects and apparently with good results.

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The subject of flies will not be discussed, as the means of their propagation and riddance is too well known, and they do not ordinarily constitute a serious nuisance in Government buildings.

CLEANING METHODS AND GENERAL CLEANLINESS

Great improvement has been effected as regards cleanliness, throughout all the buildings in recent years. This is due, partly, to an improvement in the system and partly to the adoption of improved methods. The former system that gave such unsatisfactory results relied upon the colored messengers of each division to keep the windows, cuspidors, etc., clean, and women of the general char brigade to clean the floors and office furniture. The messengers were supposed to do the bulk of their cleaning work before and after office hours. Practically, they kept about the same hours as the other employes, and neglected or shifted off on to the char women all the work they possibly could. Regarding the matter of cleaning, there was no real head or authority responsible for results. Certain parts of a building, where the division chief in charge was energetic and interested in cleanliness, would be kept clean, while other parts were allowed to become very dirty. The char women who did their work after office hours, were not responsible to any one in particular, except the head "char lady." By the simple expedient of appointing an intelligent man as superintendent of the building, or foreman of laborers, and placing the cleaning force under his charge and holding him responsible for results, at the same time relieving the messengers of any further cleaning duties, there resulted marked improvement in conditions.

Coincident with this, vacuum cleaners and electrical floor scrubbing machines were introduced. Soft pine floors have been replaced by hard wood, and carpets have given way to easily cleaned linoleum. Dry sweeping and dusting have been suppressed, and oiled rags and oiled sawdust have replaced the feather duster and the dry straw broom. These innovations have been of much service in solving Uncle Sam's house cleaning problems.

MISCELLANEOUS

Various matters of a miscellaneous character occasionally require attention together with suitable recommendations for correcting same. The proper handling of the remains of employes' lunches is an example. Lacking any special provision therefor formerly, a great deal of such material found its way into waste paper baskets. As the waste paper is baled and sold, it necessitated that the paper be picked over and such trash eliminated prior to bailng. Its presence in the open waste paper

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baskets also drew flies and roaches. This problem has been solved by the installation of small garbage cans, of about 2 gallons capacity with close-fitting covers, in all toilet rooms, just previous to the noon lunch period, for the reception of the remnants of lunches. The cans are later collected and their contents burned. The most approved pattern of can has a pedal attachment for raising the lid by pressure with the foot. Regulations prohibiting the deposition of waste food material elsewhere than in these cans, provided for the purpose, are a necessary accompaniment.

The disposal of ashes is another matter that often causes trouble. One not infrequently finds ashes dumped out on the fire-room floor and shoveled into a corner pending the accumulation of a large quantity when it will be hauled away. This accumulation unless kept well wet down, will be blown about and cover every horizontal surface with a fine, white deposit, and at the time of removal will be particularly objectionable due to the dust which is raised. The remedy for this is the storage of ashes in large cans with tight fitting covers similar to garbage cans. If necessary the cans may be swung on to a suitable apparatus of hooks and pulleys, connected with a traveler running over a single rail track attached to the ceiling, by which means the cans may be conveyed in the necessary direction for emptying into the wagon.

Promiscuous expectoration is a problem having an important sanitary bearing. It seems almost impossible of control, particularly in ill-lit basements and out of the way corners of the building, and especially in that part of a building frequented by teamsters and laborers.

In practically all the buildings an attempt has been made to solve this problem, by placing cuspidors about the rooms and corridors at convenient points, and by the posting of notices prohibiting expectoration on floors, together with the promulgation of regulations penalizing violators of this rule.

In the majority of Government buildings there exists a specially equipped room, in the basement, for the cleaning and disinfection of cuspidors. In those buildings having the best system, cuspidors are handled by tongs, collected on trucks and conveyed to the basement for cleaning by men especially employed for this work. After emptying and rinsing they are exposed to flowing steam in a specially designed trough, and a small amount of disinfectant is placed in each, before they are returned to the place from whence they came. The best equipped buildings have a double set of cuspidors, a clean set being substituted for the soiled ones at the time of their removal for cleaning.

Something might be said regarding the best type of cuspidor. A few years ago practically every type in the market could be found in

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use. Effort has been made to settle upon a satisfactory type and recommend it as a standard, so at present in nearly all buildings but one type will be found in use. This is a wide mouthed receptacle, semi-hour glass in shape, and made of enameled steel white within and blue without. All sharp curves and angles have been eliminated which would tend to render cleaning difficult. Whether these should or should not sit on rubber mats is a mooted question. It has been argued that mats encourage careless expectoration and make additional trouble in cleaning. Carelessness will probably be in evidence anyway, and the mats will at least save the floor or carpet, as the case may be.

It is worthy of note that in at least one bureau of the Government, not much frequented by the public, and in which unusually high standards for employes exist, cuspidors have been done away with entirely. Promiscuous expectoration is apparently no more in evidence here than elsewhere. After all, spitting seems to be largely a matter of habit, and the action taken by the director of this bureau probably only foreshadows what will come to pass all over the land at some future date. Let us hope so.

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RECRUITING FOR THE MILITARY SERVICE

By Major FRANK T. WOODBURY

Medical Corps, United States Army

(Continued from January)

LET us now review our hypothetical examination and fill in the outline.

A low forehead and prognathous chin, though giving an animal expression, and often the evidence of low intellectual development, may be present in very good soldiers of the colored race. A high dome-shaped head or a broad, flat skull does not give extremes of mental condition, nor does the flat occiput merging into the vertebral line, which is so constant a sign of Mongolian idiocy, always mean mental feebleness in the adult, other signs of degeneracy being absent.

A certain amount of asymmetry of the face may be attended by a very clear mind, remembering, of course, that it must not be progressive and therefore indicative of pituitary and thyroid changes or palsy. The play of the features and expression gives token of the mentality. Apparent deafness or stupidity may really be due to ignorance, in a foreigner, of the spoken words used in testing.

The so-called stigmata of degeneration can be determined only from the complete picture of the entire examination. Isolated instances of abnormal conditions are insufficient and may lead to a totally wrong conclusion, if used as criteria.

In considering what might be called, for lack of a better term, the degree of vital stamina as evidenced by the relation of the respiratory function to the bodily development, we have arrived at a table of standard relations between height, weight and chest capacity measured in inches of circumference at the nipple level.

Height in inches	*Weight in pounds*	*Minimum allowed*	*Chest circumference at expiration*	*Minimum allowed*
64[1]	128	8 pounds less	32 inches	2 inches less
65[1]	130	8 pounds less	32 inches	2 inches less
66[1]	132	8 pounds less	32½ inches	2 inches less
67[1]	134	8 pounds less	33 inches	2 inches less
68[2]	141	12 pounds less	33¼ inches	2 inches less
69[2]	148	15 pounds less	33½ inches	2 inches less
70[2]	155	20 pounds less	34¼ inches	2 inches less
71[2]	162	20 pounds less	34¼ inches	2 inches less
72[2]	169	20 pounds less	34¾ inches	2 inches less
73[2]	176	20 pounds less	35½ inches	2 inches less

[1] 2 pounds to the inch and [2] 7 pounds to each inch over 67.

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With boys the minimum may represent an over-development of one below 18 years of age. I have seen boys of 16 with the bodily development of a boy of 20 and vice versa, an evidence of personal variation from the standard, not due to ill health or undernourishment in the latter case.

In weighing the evidence as to chest capacity, if disease or constricting scars are eliminated, we must consider the muscular development present, the muscular development possible with training, judge by the framework, and general evidences of health, as well as the degree of maturity displayed.

Many young fellows under proper training, regular living and abundant good food, show a remarkable degree of development during the period of training, about four weeks, at the recruit depot.

The cardio-vascular signs with recruits are at times more puzzling than with patients, since they show heart lesions in their beginning stages, when hernia murmurs and valvular murmurs simulate each other, and secondary signs of hypertrophy, dilatation and respiratory embarrassment are wanting. The applicant may have to be kept under observation in bed and again, after exertion, examined to decide. As a general rule all murmurs not transmitted, not attended by heart muscle changes or pulse alteration, and without respiratory embarrassment or other sign of vascular stasis, may be accepted as functional.

I do not believe in temporary displacement of the apex beat by gastric or colonic gas. I have never seen such a condition.

Murmurs vary wonderfully. I have heard some which were almost audible without auscultation, which had no significance and which disappeared after thirty days of military life. On the other hand a murmur that seemed to be functional proved, by sudden respiratory embarrassment and fainting at drill, to be valvular, the result of a fever of unknown description and remote history.

I well remember being much deceived by the following combination, a blowing, sawing, systolic murmur heard at the sternal notch and transmitted to the cervical vessels, a difference of 10 mm. in blood pressure between the two arms and no radial pulse in the left wrist. The applicant had a slight dry cough, but was otherwise apparently very well. Syphilis was denied. A few days' rest in bed in the ward cured the cough and lessened the murmur. Another sphygmomanometer gave equal readings in the two arms, and the pulse lost in the radial artery appeared in an abnormal *superficialis volae*, which had taken the place of a rudimentary radial. So vanished a beautiful aneurysm.

Some time ago I noticed that Sir James Mackenzie had written instructions for recruiting officers, for publication by the British War

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Office. I have just received the circular from him, which reads as follows:

"It should be understood that the healthy heart in the young can exhibit murmurs, and variations in rate and rhythm, which are perfectly physiological in origin and indicative neither of disease nor of impairment.

"Before examining the heart, find out the functional efficiency by ascertaining how it responds to effort. This is shown by finding out the amount of exertion the candidate has been accustomed to take in the past, in his work or play, and if he can undergo severe bodily exertion without distress.

"The physiological murmurs are always systolic in time, and the situation of the greatest intensity may be at the apex, midsternum, or base of the heart. If the candidate's response to effort be normal, and the heart normal in size, the murmur is negligible, for it is manifest that, if the cause which produces the murmur hampers or embarrasses the heart in its work, the size of the embarrassed chamber will increase and its functional efficiency be impaired.

"There are only two forms of irregularity that need be considered. Irregularities indicating serious mischief will be associated with such diminution of the functional efficiency that the candidate would not seek to enlist—such as the irregularity of auricular fibrillation or of heart block.

"The most common irregularity is that which occurs in the healthy heart of the young. It is characterized by a lengthening and shortening of the pauses between the beats; it will often be found to vary with the respiration, the beat increasing in rate during inspiration and decreasing during expiration. When it does not have the characteristic respiratory character, it can be made to take on the character, by getting the candidate to breathe slowly and deeply for a few minutes. It is frequent in perfectly healthy hearts, and is, therefore, of no importance, and candidates should not be rejected on account of its presence.

"In rare cases the pulse may be found intermitting more or less frequently. If the heart be auscultated, two short, sharp sounds, rapidly following one on the other, may be heard during the pause. If this is the only sign present, *i. e.*, if the functional efficiency of the heart be good and the size normal, then these extra systoles are of no significance and the candidate should not be rejected.

"Many candidates, whose hearts are perfectly healthy, suffer from palpitation or excited action of the heart during examination. The beat becomes forcible and rapid and a systolic murmur may be present. If such a candidate be told to lie down and breathe slowly and deeply for a few minutes, the heart's action becomes less violent, and the rate slows during expiration. With a history of good functional efficiency, the candidate may be considered suitable for enlistment."—War Office, S.W., September, 1915.

Tachycardia and arrhythmia are, to a certain extent, relative terms. Only when they are pronounced, continuous under varying conditions for several days, and accompanied with other symptoms of nervous nature, can they be considered of sufficient importance to disqualify. Poor physique from exposure, poor food or recent illness, the use of

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tobacco and alcohol, or other drugs, as well as intrinsic cardiac disease, compete with hysterical and emotional states as causes. From these the transient and remediable must be separated, as such may be expected to revert to the normal in the military service.

Examinations of some 15,000 recruits have given me a different idea of the sounds of respiration. The so-called bronchial breathing is by itself a sign of nothing. I have heard many such which mimicked the sounds of lobar pneumonia, without the other signs, such as aegophony, pectoriloquy and adjacent tympany, in applicants in every other respect normal. Again, the signs of apical tuberculosis appear without disease, at times. I have held men over for microscopic and X-ray corroboration, only to find such negative; while, on the other hand, I have passed over the lung sounds and later had my suspicions aroused by a hectic flush, a slight cough and respiratory embarrassment during exercises, which were confirmed by thermometer, microscope and X-ray.

Deformities of collarbone, scapula or rib, due to active disease or old injuries, or disease which would interfere with the ability to shoulder a rifle, or carry a pack, or throw a bomb or hand grenade, or which are noticeable when the man is clothed, disqualify. I have seen some ten or eleven supernumerary or cervical ribs and never noted the arm symptoms of muscular wasting and neuritis mentioned in the surgical text-books. Old ununited fractures of the ribs disqualify.

In examinations of the abdomen and its contents, a faulty posture of the body may simulate enteroptosis, gastroptosis or enlarged spleen, especially in persons of spare figure, or suffering from uncinaria or other intestinal parasites. Excessive gas, tenderness on pressure or when taking a full breath, capillary engorgement combined with other symptoms of digestive derangement, as sallow, muddy skin, bad breath and emaciation or mere underweight, as well as suspicious lumps or liquid, call for further observation to determine the presence of parasites, gastric or intestinal disease or nervous conditions. Prominent belly, a part of general obesity, is permissible, if the obesity does not disqualify, but an enlarged belly, from whatever cause, accompanied by spareness or emaciation of the body, is suspicious and disqualifies.

Recent scars of operations, or from accidents, disqualify, as not enough time has elapsed to determine what they will do. So also do thin scars with beginning or marked herniae. Old firm scars, not attended with obstructive adhesions, giving symptoms, are permissible, if they are not extensive, thus tending to weaken the muscular effort of the abdominal wall, or not sensitive.

The size of the penis vàries remarkably and without reference to the

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general development. Signs of thickening of the foreskin, with a turgescence between erection and flaccidity in boys, may give the suspicion of masturbation. Hermaphroditism, absence and loss of the penis, epispadias and hypospadias, when the opening is very small or so far back as to prevent the normal direction of the stream of urine, and phimosis, preventing uncovering of the glands, are all disqualifying.

Simple encysted hydroceles and varicoceles, when unaccompanied by subjective symptoms, do not disqualify. Herniae, atrophy or loss of both testicles, and undescended testicle which is incarcerated in the inguinal canal, or lies just against the pubis, disquaify.

Such a condition as three testicles I have never seen, though such have been diagnosed by line officers at recruiting stations. It is due to an accompanying encysted hydrocele and is without significance. I have seen several such. I have also seen an encysted hydrocele of the tunica vaginalis posing for the testicle, which was found as a tender lump in the inguinal canal. I remember one case in which the testicle was undescended, remaining in the abdominal cavity while it was represented by an encysted hydrocele in the inguinal canal. My recollection is that the majority of these anomalies were on the right side. An epiplocele at the inner ring may also simulate an undescended testicle in the abdomen.

Hemorrhoids without symptoms and small unirritating fissures of the anus, do not disqualify as they are easily remediable. Any other diseases or deformities about the perineum disqualify.

Scoliosis and short leg, unnoticeable when the man is clothed, do not disqualify, but kyphosis, or caries, or stiffness of the spine, not due to lumbago, disqualifies.

The feet must be strong and well arched without disabling troubles, as hallux valgus and bunions, corns, hammer-toes or overriding toes which cause pain. The colored race is almost plantigrade normally, however, and with prominent heels.

All unusual conditions of the legs as to joints or bones must be judged in the light of the requirements of the military service. The same applies to the upper extremities. Loss of the thumb and great toe, loss of any two toes on the same foot or any finger except the little finger, loss of the last two phalanges of any two fingers on the same hand, or of more than one phalanx of the right index (trigger) finger, ankylosis in any position of the second and third joints of fingers or toes and webbed fingers and toes disqualify.

Exostoses, enchondromata, subluxations, loss of the carrying angle of the elbow, very large hands or feet, out of proportion to the body, disqualify.

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Ataxic gait and stiffness in joint movements disqualify, remembering that young applicants and those from the country are often awkward and clumsy in movement. Sometimes recent trivial accidents with contusions, or slight sprains which are not permanent, simulate permanent disabilities.

Nervous disorders give evidence during the examination by tremors, weakness, wasting, inability to perform certain of the exercises and altered reflexes. I remember once examining a soldier, who had been sent to the hospital because of weak legs and inability to keep up with his company. Examination and inquiry developed that he had concealed from the recruiting officer at Fort Slocum that he had been discharged from the Navy on a medical survey by reason of sequelae of an attack of epidemic cerebro-spinal meningitis.

Whenever the trained eye of the examining surgeon notes any unusual sign, no matter how trivial, he pursues it with all the agents at his command. This sometimes brings to light conditions which had been concealed by the applicant or which had escaped his previous investigation.

Occasionally an epileptic has a fit during the course of the examination, otherwise, unless he shows a bitten tongue or lips, many old and new bruises, a marked pasty, putty-colored skin and a certain dullness of expression, the condition might have been undiscovered.

The age of the applicant is of interest because boys under 18 years of age cannot be enlisted, and if under 21 years must have the written consent of father, only surviving parent, or legal guardian.

Many boys run away from home and try to pose as 21 years of age. This is sometimes difficult to decide, as great disparity between age and development is most marked at this period of life. Precocity and retarded development appear side by side before the eyes of the puzzled examiner. He must decide first upon development. No matter what the age, if the body be immature, it will not bear the strain of the military service. The evidences of maturity are—a well-formed musculature which has replaced the smooth, rounded outlines of childhood, wisdom teeth sometimes, hair on the face, the axillae, the pubis and genitals extending up on the abdomen and about the anus, testicles well formed and the penis and scrotum darker than the adjacent skin and the scrotum rugose, the voice deepened and usually a certain air of self-reliance and manliness. Next a close questioning as to who signed the minor's consent, whether he has not run away from home, how his mother would feel about it, combined with a clear explanation of the penalties of fraudulent enlistment and the certainty of his being found out, often breaks down the imposition and clarify an otherwise difficult situation.

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The behavior of the applicant during the course of the examination is an excellent guide to his mental condition, and often to the discovery of malingering and fraud. Volubility is always a cause for further observation for insanity. Stupidity, taciturnity, apathy, sullenness, dullness, silliness, reasonless mirth, excessive friendliness or undue intimacy, are all indications of disordered mentality and call for further observation in the quiet of the hospital ward. Sometimes an apparent stupidity is due to ignorance of the English language in foreigners, or to deafness. A filthy body, with parasites, a disordered dress, worn with untidy carelessness, a skin marked by scabies, all evince mental deterioration, though occasionally a man may be unfortunate, in which case he shows some personal pride and intelligence.

As to the organs of special sense, vision under 20/40 in the right eye, and 20/100 in the left, disqualifies and if above this, but subnormal, the defect must be due to error of refraction only and be correctable by proper lenses. Men of the hospital corps and ordnance department may have vision of 20/70 in both eyes, correctable to 20/40 with proper lenses, and not due to disease. A blind eye or exophthalmos, or trachoma, or epiphora from disease of the lids or lachrymal apparatus disqualifies.

Sometimes a man may simulate blindness in order to be rejected and get transportation to his home town, having changed his mind about enlisting. This is discovered by the usual tests of prisms, high numbered lenses and the red and green letter card, with glasses of red and green color.

Color blindness disqualifies for the Signal Corps, the Aviation Corps and any position requiring color perception.

The distinction between trachoma and simple granular lids is frequently very difficult to make, in the border line cases. Personally, I believe them to be only different stages of the same condition. When the source of irritation and the bad environment are exchanged for a hygienic life and constant care of the surgeon, the condition frequently clears up very promptly. Indeed, this is one way of coming to a decision. The suspect is held for several days, during which time he receives appropriate treatment. If the condition improves he is enlisted.

Anosmia and active nasal disease, especially of the chronic type, obstruction of one nostril from any cause and loss of the nose, disqualify. Old healed lesions not due to syphilis and not causing symptoms do not disquality.

All diseases of the mouth and gums as pyorrhea alveolaris, tonsillitis, ulcers and suspicious sores or warts about the lips and exces-

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sive loss of teeth, preventing proper mastication of food, are causes of rejection.

Laryngeal changes due to paralysis or active disease which is not transient and remediable within reasonable time, disqualify.

In time of peace, under a volunteer system of recruiting, the War Department competes in the labor market with other employers and can afford, to a certain extent, to be particular in its selection. But in time of war, when the fighting machine should be at its maximum strength and efficiency, the urgent necessity compels us to lower the standards and admit to the Army men not physically fit and who are, in addition, untrained. Imagine, if you can, a baseball manager being particular in the winter time and then filling up his team, while the audience fills the bleachers, with anyone whom he can get under offer of bounties or threat of conscription. Who would not think him insane? Yet such has been our method of raising an Army when we have really needed such.

The ignorance of our people as to what constitutes a soldier, the character of his work and his obligations to the country, has been exemplified in all of our wars. Actuated by impulse and example, not all, else we would have no army, but many of our volunteers flock to enlist. "Come on, Harry and Frank; join our company. Bill's going to be captain and I am going to be lieutenant." With the same degree of reckless irresponsibility and ignorance they meet all the requirements of military service, and every defective who couldn't march with his company, on account of a bunion, or who had a suppurating bubo, or chronic constipation or was a weakling, soon returned with a sick leave, to be welcomed at the station by the village band and the school children in white dresses and flags and an address on "Our Heroes," by the mayor or a local representative. Later on the village lawyer, sniffing fees, busied himself with pension claims. "Everybody's getting a pension, and you are entitled to one just as much as the rest," he says, and thus stills the voice of patriotism in the siren song of greed.

I am firmly convinced that, when the day arrives on which the American people in Congress assembled shall decide by legal enactment that military duty shall be an equal obligation with jury duty, on all citizens, it will be the greatest advancement made by our people since the Declaration of Independence was signed.

My reasons are founded in medical experience.

First and foremost it would take the youth when his body is trainable and his mind plastic. It would develop both in the highest degree. It would bring his body to a physical maximum of efficiency. It would fix habits of correct living. It would bring about the correction of bodily

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defects in their early stages, when the greatest amount of correction might be expected, and make the most of even limited possibilities, by appropriate training.

It would train the mind in habits of self-restraint and obedience to authority, which would make the man respectful of the laws of health and of the community. It would teach him truthfulness, honesty, self-reliance, self-respect, coöperation, the meaning of service and the feeling of true patriotism. It would take possession of the idle hours of the incipient criminal and law-breaker and fill them with legitimate occupation and training, which would awaken new ambitions and break up evil associations—a result not yet attained by our school system. This would help in the solution of our present great civic problems, the criminal and the unemployed.

A great German teacher said, "What you wish to see in the laws you must teach in the schools."

Second, it would bring about an annual physical examination of the citizen soldiers, whereby the latent and unrecognized ailments might be discovered and studied and treated before the individual became an invalid or died a sudden death.

Third, it would extend our classification to include a large number of those who are rejected for active military service, but who are not actually ill and who might be used in appropriate positions in the military service, which do not call for service in the ranks.

All the office duties, munitions making, cooking, driving teams and many other positions readily brought to mind in connection with administration, supply and hospital work, would be suitable for a large class of this type as auxiliary to the fighting force.

Fourth, being confronted with actual demonstrable working facts, and living in a service of actual experience, it would tend to dispel the mental fogs of the mentally untrained and bring into our national life a more wholesome coöperation and understanding of the idea of government and the obligation of every citizen to our country.

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DEMOGRAPHY IN SO FAR AS IT RELATES TO THE VITAL STATISTICS OF ARMIES

By Lieutenant Colonel WESTON P. CHAMBERLAIN
Medical Corps, U. S. Army

(*Continued from January*)

Yellow Fever

SUSCEPTIBILITY to infection with yellow fever has been said to vary inversely with the distance from the equator of the residence of the person exposed. It has often been claimed that negroes, half-breeds and creoles possessed a racial immunity, but it is more probable that the apparent immunity of such individuals in adult life results from residence in a more or less endemic center which led to a mild attack of the disease in childhood. There is no reason to suppose that the negro possesses any greater powers of resistance than does the white man born and raised under similar conditions. In 1898, the admission rate for yellow fever in our Army was about five times as high for colored men as for whites, but this great excess of cases was mainly due to greater exposure, these colored troops being put at duties where infection was especially liable to occur. In the British West Indies the case mortality for the decade 1889–1897 was 50 per cent higher for whites. In our service in the years 1898 and 1899 there was a case mortality of 13 per cent for white men and 11 per cent for negroes.

Beriberi

A few years ago one would have said that there was no better example than beriberi of the racial prevalence of a disease. The importance of this malady from a military standpoint is well shown in the case of the Russo-Japanese war, the Japanese, according to Shibayama, having had 200,000 admissions from this cause alone. Among our Filipino soldiers, as well as throughout the civil population of the Philippine Islands, the disease was formerly rife, resisting all efforts to control its ravages by ordinary sanitary precautions. Although the Caucasians mingled freely with the sick Filipinos the disease did not spread to them. To be sure, a few cases among white men have been recorded in the Army and Navy statistics, but in no instance was the diagnosis above suspicion, and in the light of present knowledge, it appears probable that the men in question were in reality suffering from alcoholic neuritis (22, 23). We now know that the peculiar incidence of beriberi was not a result of race, *per se*, but of racial dietary habits, and since

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a ration containing a sufficient amount of vitamins has been provided this disease has disappeared from the native troops, and also from the civil institutions (6). It still persists among the civilians who either cannot or will not change their dietary.

Typhoid

It is stated in Munson's Hygiene that negroes and other colored races undoubtedly possess an immunity to typhoid fever. Hoffman on the other hand considers that the negroes today are far more liable to typhoid fever and malaria than are the whites. Until quite recently the existance of typhoid among tropical natives was ignored or denied, and malaria was made a scapegoat for diagnostic shortcomings. As a result of the work of Manson, Rogers, Castellani, and many members of our own medical corps, it is now well established that typhoid fever is a common disease among the natives of India, the Philippines, and probably most other tropical countries (11). There is much reason to think that such immunity as adult natives appear to possess is the result of an attack of typhoid in childhood.

For our own military service the earlier racial statistics (gathered at a time when the differential diagnosis of typhoid was less carefully made than now) show a great preponderance of enteric fever among white men. From 1867–1883, the admissions were in the ratio of 3.58 to 2.59 in favor of the colored troops; in the decade 1880–1889, negroes 2.81, white 5.42. In 1898, the admission rates were 93.24 for whites and 27.64 for negroes. For the decade 1890–1899, the rates were 21.86 and 7.69 respectively. I have compiled the statistics for the years 1904 to 1909 and the figures show that the racial differences have been of the same character as in the past, but even more marked. In the United States the admissions were very much greater every year for white men, the average for six years being nearly five times as great. In the Philippine Islands colored troops were present only in 1906, 1907, 1908 and 1909, and there were no deaths from typhoid in any year and no admissions except in 1909, when the rate was 1.7 as compared with 6.6 for whites. For Filipinos the admissions were about one-third of the rate for whites serving in the Philippines.

Munson states that the case mortality for enteric fever is higher among colored troops than among whites, and this holds true in the United States for the period covered by Table XIV. For Filipinos also the mortality was a little higher than for whites, but, as I have shown in a previous article (11), it is probable that mild and atypical cases failed to be correctly diagnosed more frequently among the Filipino scouts than among American troops, and consequently the

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mortality rate for natives was made to appear higher than it really was. For the period from 1888 to 1903, inclusive, there were among white soldiers 26,547 admissions for enteric fever with a case mortality of 11 per cent, and among negro soldiers 372 admissions with a case mortality of 23 per cent.

TABLE XIV.—*Admissions and Death Rates per* 1,000 *for Typhoid Fever for American Army in United States and Philippine Islands,* 1904–1909.

Calendar year	United States				Philippine Islands					
	Admissions		Deaths		Admissions			Deaths		
	W	C	W	C	W	C	F	W	C	F
1904	6.0	0.6	0.29	0	1.9	x	0.9	0.42	x	0.65
1905	3.8	0.9	0.30	0.30	2.8	x	1.5	0.27	x	0.40
1906	6.0	0.4	0.30	0.40	4.1	0	0.8	0	0	0.20
1907	3.6	1.0	0.20	0	4.2	0	1.3	0.30	0	0
1908	3.0	1.4	0.23	0	3.4	0	1.8	0.51	0	0
1909	3.1	1.0	0.27	0.52	6.6	1.7	1.3	0.17	0	0.18

Malaria

It has been considered by many that negroes, native to and living in a malarious country, possess an immunity to malarial fevers. Munson thinks that this immunity is lost to a considerable extent after long residence in a non-malarious climate, and does not exist to any very great extent among negroes native to regions where this disease does not commonly prevail. It is now known that in malarious localities very great numbers of individuals apparently in good health are victims of latent malaria, in other words carriers of plasmodia. These individuals, possibly as a result of the action of some antitoxin, have acquired an *immunity to the more characteristic effects* of the malarial toxin, even though parasites may be developing in their blood. An average of the results of various observers in the tropics places the latent infection rate of adult natives at 23 per cent (12). It is probably this relative resistance to the *usual and distinctive manifestations* of malaria which formerly gave rise to the opinion that tropical races were largely immune to paludal disease. This misunderstanding of the true state of affairs has led undoubtedly in the past to extensive infection of white men from the very natives whom they supposed to be immune.

In the past, admissions for malaria in time of peace, among American troops have invariably been more numerous for white men than for

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negroes. For the decade 1888–1897, the rates were 83.89 per thousand for white, and 40.81 for colored soldiers. In Table XV, I have compiled the admissions during the last ten years for troops serving in the Philippines and in the United States separately. The rate for whites was much higher every year in the Philippines, and every year save one in the United States. For the whole decade, both at home and abroad, it averaged nearly three times as high as for colored men. For Filipinos, however, the admissions were much more numerous than for white men, averaging over 75 per cent in excess. In the Porto Rican native regiment the admissions were high, approximating 138 per thousand annually throughout the last decade.

TABLE XV.—*Admissions per* 1,000 *for Malaria for American Army Serving in United States and in Philippine Islands*, 1905–1914.

Calendar year	United States		Philippine Islands		
	W	C	W	C	F
1905	48	17	262	x	573
1906	52	21	318	45	393
1907	31	1	190	49	313
1908	27	12	134	80	237
1909	24	9	115	85	204
1910	17	5	86	x	243
1911	15	1	76	x	242
1912	15	4	186	46	242
1913	8	8	126	39	193
1914	11	2	49	30	202
Mean....	22.5	8.2	156.1	53.6	280.4

Alcoholism

For no other cause of entry on sick report is the influence of race on military statistics so marked as in the case of alcoholism. For the decade 1887 to 1896, the rates of admission were 40.35 for white and 4.99 for negro troops. In the West Indies for 1897 the admissions for English troops were 15.6 and for negroes 0.6. For the last decade in our Army the discrepancy between white and colored troops has been less marked than in former years, but alcoholism is still very much more frequent among Caucasians, the admission rate for the whole Army (both in United States and in foreign possessions) averaging more than three times as high for white troops as for negroes. For the Filipino soldiers the admissions were always negligible, being less than one-

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fiftieth of the rate for white soldiers. For Porto Rican natives, on the other hand, the rate was nearly as high as for white men.

Munson tells us that few colored soldiers are hard drinkers, and that they seem to have a racial distaste for malt liquors. He further states that when colored troops replace a garrison of white soldiers the canteen profits from beer and wine are greatly diminished, while sales of cigars and confectionery are proportionally increased. Possibly the abolition of the canteen feature of post exchanges may have something to do with the circumstance that in the decade 1905–1914, admissions for alcoholism averaged much lower for white troops, but a great deal higher for colored troops than was the case in the ten-year period 1886–1895.

TABLE XVI.—*Admission per* 1,000 *for Alcoholism and Its Results for American Army as a Whole*, 1905–1914.

Calendar year	W	C	F	Calendar year	W	C	F
1905	31	8	0.6	1910	25	5	0.4
1906	33	8	0.6	1911	22	8	0.8
1907	36	10	1.3	1912	18	9	0.4
1908	30	11	1.0	1913	16	6	0.2
1909	25	6	0.2	1914	16	5	0.6
Mean	.....	.....	.....	.....	24.0	7.6	0.5

Resistance to Extremes of Heat and Cold

It is generally considered that northern races possess greater resistance to cold than do those of tropical countries. In the United States Army the admissions for frost bite per thousand for the decade 1879 to 1888 was 6.33 for white and 27.46 for colored soldiers. For the decade 1905–1914, I found that in every year but two the admissions for negroes greatly outnumbered those for whites. The ten-year average was nearly five times greater.

Though met with among all, it appears that race exercises a certain amount of effect on the incidence of heat stroke. Castellani states that it is more common among Europeans than in negroes and East Indians. Negroes seem to possess a notable immunity. In our service for the decade 1880 to 1889, admission rates for heat stroke were 1.76 for whites and 0.52 for negroes. During the next decade 2.57 and 1.20. In the period 1905–1911, inclusive, there was no instance of sunstroke recorded for negroes in the Philippines and only one case in the United States. In the years 1912, 1913, and 1914, admissions for effects of

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heat averaged twice as high in the Philippines and three times as high at home for whites as for negroes. For Filipinos the admissions were intermediate between those for white and for negro soldiers.

For the period 1905 to 1911 only "sunstroke" is included in this table while for 1912, 1913 and 1914 the "effects of heat" include sunstroke, heat exhaustion and other effects of high temperature.

TABLE XVII.—*Admissions per* 1,000 *for Frost-bite and for Effects of Heat for American Army*, 1905–1914

Calendar year	Frost-bite		Effects of heat				
	United States		United States		Philippine Islands		
	W	C	W	C	W	C	F
1905	0.86	12.02	0.10	0.30	0.45	x	0.63
1906	0.71	4.43	0.08	0	0.68	0	0.21
1907	0.59	1.92	0.06	0	0.20	0	0
1908	0.57	0	0.11	0	0.41	0	0.59
1909	1.29	4.59	0.07	0	0.26	0	0
1910	1.01	4.02	0.08	0	0.08	x	0.59
1911	0.78	4.09	0.17	0	0.16	x	0.19
1912	0.68	3.22	1.47	0.80	4.63	0.74	1.11
1913	0.38	1.77	1.52	0.59	2.67	3.87	1.86
1914	0.82	.55	1.41	0	3.94	1.60	2.99

Miscellaneous Conditions

It is thought by some that native races in the endemic centers possess a partial immunity to cholera, but this is doubtful. The incidence and severity of the disease is generally considered greater among negroes. In the United States Army in 1866, the mortality for negroes was 135 per thousand and for white troops 77, but I have no data to show if the case mortality was higher for colored men. In a small epidemic in 1902 among our troops in the Philippines, Woodruff found the approximate death rate among those exposed to be 10 per cent for white troops, 23 per cent for negroes, and 8.8 per cent for Filipino soldiers. For the 1902 epidemic the figures shown in the report of the Surgeon General for 1903 give a case mortality of 60 per cent for white men, 51 per cent for negroes and 61 per cent for Filipinos.

Race probably has no effect on susceptibility to bubonic plague except in so far as it affects the sanitary surroundings of the individual. On the mortality, however, its influence is very striking. Manson

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states that during an epidemic of pest in Hong Kong the mortality was 93.4 per cent for Chinese, 77 per cent among Indians, 60 per cent among Japanese and 18.2 per cent among Europeans. Probably a large part of this difference depended upon the attention and nursing available.

Munson states that colored races are especially susceptible to smallpox and also suffer a heavy case mortality when vaccination has been imperfectly performed. I collected the figures for our Army from 1890 to 1902 and found that the admission rate has been much higher for black troops. In 511 cases among white soldiers the case mortality was 28 per cent, and in 129 cases among negroes it was 41 per cent.

It is probable that given similar opportunities all races are equally susceptible to infection with hook-worms. When infected, however, race seems to materially influence the severity of the resulting symptoms. The negro possesses a high degree of racial immunity to the effects of uncinaria, and it is my opinion that the Filipino rarely suffers appreciably from this cause. The very marked disability produced among white men in the south, and among Porto Ricans, is so well known as to need no description here.

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(*To be continued*)

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EDITORIAL

THE TIME FACTOR AND PREPAREDNESS

General Forrest, of the Confederacy, epitomized the art of war in his saying that military success depended on "getting there first with the most men." He did not speak of "getting there some time, or anytime"—he said "first."

All through the present war we have seen, over and over again, the truth of Forrest's saying borne out by results. Certain nations have been "getting there," but always too late to secure commensurate success. They have been tardily getting ready for military action at a time when the military situation demanded the action itself and, therefore, have had to lose the tremendous military advantage of being able to take the offensive. Ultimately and belatedly they have gone through all the tremendous preparations necessary, shouldered the vastly increased cost of the same, and made an unduly bloody sacrifice of men and lives—all because the time factor had been previously overlooked, or disregarded, in their calculations. When they finally aroused to a realization of its vital importance, the critical period has passed by and the opponent, operating through a shorter time factor, had secured, and used to the fullest, the advantage of men and position.

The American people seem strangely to have overlooked the almost paramount value of time, in respect to the success of military operations. They have apparently learned nothing in this regard from the European war. They seemingly have not grasped the great truth, that initial success may be the deciding factor in the campaign or war, and that such initial success depends directly on the degree of preparedness. In other words, on ability to use a shorter time factor than the opponent—"to get there first with the most men."

They seem to treat time as a negligible quantity, and are prodigal of this factor, though it be recognized by all military men as of basic importance in war. They apparently are willing to accept all the increased burdens and cost of delay, and to sacrifice armies in later securing positions of tactical advantage that, with preparedness, might have been occupied without resistance. Every conception of such military plan as is generally advanced, seems to contemplate the beginning of training and preparation after hostilities are declared and blows are struck.

In all the newspaper comment on the war, THE MILITARY SURGEON has never noticed a single item referring to the time factor. Apparently the country assumes that, in some way or other, it will ultimately

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muddle through its difficulty. While proud of its potential resources, the nation blinds its eyes to the fact that these are not immediate military assets and assumes, without warrant, that the enemy will generously suspend military operations for the long time necessary to convert the former into the latter. As well might a peaceful citizen, assaulted by a footpad, expect immunity while he undergoes training in boxing, so that he may be able to defend himself.

This time concession and delay of hostilities are exactly what no intelligent and vigorous enemy would ever grant us. He would strike at once and strike hard, to paralyze at the outset the complex, cumbersome machinery of preparation we propose, tardily, to attempt to create and set in motion. He would wring every particle of advantage out of the time factor.

Had the call for the present mobilization come against a first-class power, the indemnity would doubtless have long since arrived at the foreign capital. Our latent resources, large though they may be, are no bulwark against the sudden, swift and mighty blows of modern warfare, any more than next year's crops would be of value in a present famine. This nation has no France, as England had, to raise a stone wall, behind which there is opportunity for the two years' intensive preparation demanded by modern war.

The Medical Department has not the power to govern the general military policy of this country. But it sees, at least as clearly as any other branch of the service, the necessity for preparedness. Long in advance of the present mobilization on the border, it realized the value of the time factor. As a result there has been no complaint as to shortage of medical supplies, because they were procured and stored against the time of their need, and were ready when emergency required. It had contended, against opposition and inertia, for a personnel adequate to utilize its supplies in time of stress. It was training its medical reserve officers for years before any other branch of the service had such a supplementary force. It has been a leader in this, as in many other military affairs, and has set an example in forethought and preparation which has not been lost upon the rest of the army. So far as it is concerned, the emergency found it prepared to function in a quite satisfactorily short time factor.

But the success of the Medical Department, in its broader sense, cannot be dissociated from military success as a whole. This, for the future, depends upon preparedness, upon a short time factor, upon ability to "get there first with the most men."

There is absolutely no plan that will satisfy the nation's need in this respect, other than that requiring universal military training.

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The issue cannot be evaded, and it is easy to see through the specious arguments created to becloud it. When any military emergency arises, it must find the men trained, the guns on hand and the supplies in stock. To attempt to get along with less is for the nation to throw dice with destiny. The provision in advance, of adequate military defense, means that the rights of the country will not be assailed and that it will mercifully be spared the necessity of utilizing the military agencies so provided. There need be no fear of aggression by any other nation, if there is a world knowledge that we are the ones who, as a result of forethought based on common-sense, will "get there first with the most men."

Aside from the military aspect of the matter, THE MILITARY SURGEON stands for humanitarianism. It is against war as such. It is against pain, sickness and sorrow. And it believes that proper preparedness, based on universal military training, is the greatest safety insurance against the wholesale death and suffering of war, which it is in the power of the nation to accomplish. It believes in military preparedness as the most effective measure for peace and humanitarianism. It believes in applying to the people as a whole the motto, that all so unhesitatingly adopt as individuals—the motto of "safety first."

E. L. M.

CONSCIENTIOUS OBJECTORS

"Conscientious objectors" have given recruiting officers no end of trouble in England; in fact they were a positive menace until the few sincere, though misguided, members of that cult were weeded out from the many "slackers," who sought to evade military service under that excuse. The conscientious objectors offer an interesting psychological study and, if honest in their convictions, should not be dismissed with contempt, even by those who cannot understand their motives. But they, or we, should not permit their views to be used to jeopardize the safety of the country.

That there is a large and flourishing organization of such, honest or otherwise, among our own fellow-citizens is painfully apparent, though sailing under another flag.

We learn that the "American Union against Militarism" has had a hearing before the Senate Military Committee, at which vigorous argument was made against the claim that "physical benefit would be derived from military training in the schools."

The committee was a somewhat heterogeneous one, composed of physicians, educators and college students, among the latter a "psychologist," who confidently asserted that "the psychology of military train-

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ing was opposed to every educational theory of American democracy, and that the enactment of compulsory military training would be the greatest step backward the nation had ever taken." The sole purpose of such training, this public-spirited citizen added, was to train out of a man his individual initiative and to cultivate the instinct (?) of submission. He solved the problem of national defense with the sweeping statement that the country could buy all the soldiers that it needed. Students of several large universities had an opportunity to deliver their mature opinions along the same line.

Most significant from a medical standpoint, was the statement by a well-known physical instructor, that "ordinary gymnastic physical training was much to be preferred to military training." A mild protest by Senator Chamberlain, calling attention to the fact that all the speakers had mistaken entirely the circumstance, that there was no intention of making the schools military nurseries, was unheeded.

We would not waste time in referring to the perversion of facts so clearly illustrated, were it not for the effect which it might have on those who do not weigh all the evidence. The statement that the "fatalistic ideas about war" inculcated at Plattsburg, outweighed all the benefits derived from the discipline and physical training, comes with bad grace from a Yale man, who assumes to represent his fellow-students.

Without discussing the "psychology" and apparent lack of patriotism, displayed at the hearing, we desire to emphasize the fact that the well-known physical instructor showed lamentable ignorance of his own specialty, when he spoke lightly of the physical training of young recruits. Captain Koehler could soon convince him of his error, if he would but study the work of that "maker of men" at West Point and at Plattsburg. He does not need either guns, or the prospective horrors of war, in order to remould his pupils mentally as well as physically. Medical officers can hardly be suspected of "militarism" (which has become a shibboleth), yet their experience and observations lead them to the almost unanimous opinion, that the salvation of the youth of this country, moral and physical, lies in some system of universal training (call it by what name you will) which shall teach them not only an erect and manly carriage, but respect for themselves and their elders, discipline, good manners, and team play for their country. That lack of initiative, or slavish submission, could follow such training no candid man would admit.

Does the well-known physical instructor believe that college athletics promote a perfect physique and the "staying qualities," necessary in the fierce competition of modern life? He must know, as does every medical officer and life-insurance examiner, that his trained athletes

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are *not* the "best risks," either for the Army or Navy, or in civil life, and that, other things being equal, they do not outrun or outlast the average man, who has learned to be moderate in all things. One need only refer to the statistics compiled by former Surg. Gen. Charles F. Stokes, U. S. Navy, giving the after-history of athletes at Annapolis, to be convinced of this. Such moderation, such all-round physical development, is more likely to be inculcated by systematic military training than by athletic sports, the apparent object of which is to develop the specialist and ignore the rank and file. The methods of the civilian physical instructor have failed, else why are so many of our people rejected by the recruiting officer? Our race is confessedly deteriorating physically—should we not substitute a better method?

"Conscientious objectors" there always will be, no matter the subject, and they are entitled to their day in court, but surely they must present arguments stronger than those they offer against national preparedness, if they hope to convince intelligent people.

H. C. Coe.

THE CORRESPONDENCE COURSE FOR MEDICAL RESERVE OFFICERS

The Correspondence Course for the Medical Reserve Corps (inactive) is well along in the second year, and we are gratified to hear that 810 officers are now enrolled in Courses A and B. A similar course has been inaugurated for the Medical Reserve Corps, U. S. Navy, in which practically the entire corps is participating. Its popularity is doubtless due to some extent to its novelty and the fact that it extends over only one year.

We have made inquiry as to the reason why many student-officers who completed Course A, either balked at B or do not seem to show the enthusiasm with which they began. Various excuses have been offered—lack of time or of interest, a disposition to question its practical value as a means of medico-military instruction, and a feeling on the part of the older men that it is beneath their dignity to return to the methods of their college days. As a matter of fact, however, many of the "grey beards" are courageously tackling Course B, not only because they believe that they ought to set an example to the younger men, but because they do not wish to neglect any opportunity to acquire a knowledge of their duties as medical officers. However irksome the work may appear, there are certain definite reasons for it, aside from the fact that the questions have been carefully selected by instructors who know the needs of their students better than they themselves. Doubtless most members of the Reserve Corps have read their manuals with inter-

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est and profit, but it is an entirely different matter to *read* a text-book and to *study* it, with the view of storing in the mind certain concrete facts which will *stick* and can be applied to a practical use. They may seem to be quite forgotten, but, when the occasion arises to recall them in connection with active service in camp and field, their *raison d'être* is self-evident.

Every man who continues the Correspondence Course either has had some experience as a medical officer, or is impressed with the probability that he will have it—the natural correlation between theory and practice.

President Porter, of Yale, used to say: "The principal benefit of a college training is that it teaches a boy to do what he does not care to do, at a time when he does not care to do it." May we not apply this principle to the apparent drudgery of the first two courses, which are only a preparation for the higher studies of map reading, field problems and sanitary troop leading? To one who dimly recalls his student days and his lost facility for "cramming" for exams, it is profitable to relearn the art of arranging scattered facts and stating them in an orderly way, clearly and concisely. Those of us who have had a long experience in reading college examination books, feel instinctively when a student really knows his subject, and when he is simply "sparring for time" and—mark him accordingly.

One cannot learn to drill a detachment by studying manuals, but he *can* learn what are the duties of medical officers and at least the elementary principles of paper work.

Don't drop out because B requires more time and study. It is not a kindergarten, but a man's task, and is worth the trouble.

If one does not accomplish anything more, he may acquire a terse, military style, which is not without its advantages, even to a literary man. Keep on, and, if the work is not interesting, *create* an interest.

It is most gratifying to note this statement of the Director of Field Service and Correspondence Schools: "Those members of the Medical Reserve Corps who took the course (A) and later went on active duty, showed a most satisfactory appreciation of what would be expected of them in preparation for field service, and I cannot but feel that the time taken in studying was spent to their personal advantage and to that of the service."

H. C. Coe.

MANEUVERS OF SANITARY TROOPS

Extended field exercises in time of peace, of comparatively large bodies of troops have, during the last few years, been modestly indulged in by convenient sections of our Army, as occasion offered and appro-

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priations permitted; but maneuvers for special troops have heretofore had no place in the curriculum of our service. It goes without saying that such is *not* the case in other armies, especially as to sanitary troops.

With us the size, function and necessarily intricate operations of this branch of the service in war, are only now beginning to dawn upon the people, and the necessity of a very special apprenticeship and prolonged training for the sanitary soldier, to be appreciated.

The maneuvers at Leon Springs, Tex., under the direction of Lieutenant Colonel Munson, M. C., U. S. Army, who, to the very largest degree, is responsible for the conception and execution of the exercises, the first of the kind in our country, mark a distinct advance in the practical education of the Army, and in the broader efficiency of the sanitary forces.

A careful study of Major Turck's interesting report, published in this issue, even though the details of the work are necessarily lacking, must convince those of us who are plodding through the sometimes bothersome correspondence course, that the problems which now seem so academic, may some day, in their correct solution, become of vital importance to us all. To be sure these problems often seem to demand imagination beyond the average supply, for, as Major Turck remarks, "to work with real men and animals and equipment and machines over miles of territory, is quite different from moving pegs on a map." Nevertheless the moving of "a red-topped tack from a to z," if done with intelligent appreciation of what it means, is far better than utter lack of knowledge of its object, for through it, the map problem, the maneuver and the battlefield become complementary.

Let us hope that opportunity may soon be given us all to participate in real sanitary maneuvers, such as Colonel Munson has so successfully inaugurated; and, in the meantime, we must take advantage of the correspondence course and map problems, to prepare ourselves to profit by the opportunity, when it does come.

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COMMENT AND CRITICISM

A REVIEW OF THE PRESENT STATUS OF LOCAL TETANUS

THE prevention of tetanus continues to receive the attention of writers on military surgery and it is safe to state that the control of this deadly complication of war wounds, by prophylactic injections of antitoxin, will be regarded as one of the great triumphs of preventive medicine in the present world war.

"Les Formes Anormales du Tetanos" is the title of one of a series of monographs by M. Courtois-Suffit, Medecin des Hospiteaux de Paris, and R. Giroux, Interne des Hospiteaux de Paris, with a preface by Prof. Fernan-Widal. (Paris, Mosson et Cie. 1916, pp. 174.) This little book deals with the forms of tetanus as observed and treated in the earlier part of the war. It deals, also, with the abnormal forms of the disease, as noted and much better understood at a later date, forms that are far more frequent than most surgeons suspect.

The atypical varieties of tetanus referred to are those with manifestations of the disease confined to the head and others in which the affection is confined to the limbs. The cephalic forms are those (*a*) with involvement of eye muscles; and (*b*) those in which the hypoglossal or other cranial nerves may be involved. In the localized forms affecting the limbs, the affection may be monoplegic or paraplegic; and other forms in which muscles of the trunk alone are involved.

In the preface, Prof. Widal calls attention to the emphasis which the authors place on what they style tetanus of incomplete immunization. They refer to the atypical and partial forms of tetanus as a result of insufficient vaccination with antitetanic serum; the same way that we now see cases of attenuated typhoid fever from insufficient dosage with serotherapy. The atypical forms mentioned point to the necessity for further dosage in the clinical history of these tetanus cases. The authors are insistent on timely and sufficient prophylactic injections in war wounds as the only trustworthy method of preventing tetanus.

In *The Lancet*, November 18, 1916, page 877, Sir William Osler states that he has seen nine cases of so-called local tetanus since his attention has been called to the subject. According to him, the cases fall under three groups: (1) local spasm of a limb preceding for several days the onset of severe tetanus; (2) true localized tetanus confined to one limb, or to a group of muscles, or to both legs. Recovery is the rule in such cases; (3) pseudo-tetanus.

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Osler warns us that every muscle spasm following a wound is not tetanus. At one of the consultations the practitioner mentioned a case of supposed tetanus, but upon visiting the ward the patient was out. The notes stated that the spasms in one leg began immediately after a scratch received from a wire, and the description given by the nurse suggested a form of functional spasm. Another patient had clonic spasm in one leg, varying with posture and much magnified when watched. The case was finally put down as a neurosis. Sir William states further that, possibly, there are cases of reflex spasm, associated with wounds, such as are described by Babinski.

Last August a memorandum on tetanus was issued by the War Office Committee on the Study of Tetanus, which formed a guide to all medical officers in the British Army, for the prophylactic treatment of tetanus. A revised circular has more recently been issued on the same subject by a special tetanus committee.[1]

The prophylactic injection of antitoxin is now the rule in all war wounds and, although there are cases still occurring, the disease is now seen in smaller numbers. According to the circular, there is strong experimental evidence that the immunity conferred by a primary injection of antitoxin is lost in about ten days. For that reason it is considered advisable to give a second subcutaneous injection in all septic wounds at the end of seven days; and further, in wounds following a chronic course, caused by shell fragments or bombs, a third and fourth injection should be given at intervals of seven days. The danger of anaphylactic shock is said to be negligible when prophylactic doses of 500 U.S.A. units contained in 3 cm. of horse-serum are administered subcutaneously, whatever the interval after the preceding injection.

Dosage in Prophylactic or Preventive Treatment of Tetanus.—The memorandum recommends that the primary dose be given at the dressing station, and the subsequent doses at home hospitals. The ordinary phial contains 1,500 of tetanus antitoxin, of which one-third should be administered subcutaneously to each wounded man. The serum is aseptic and, moreover, it contains an antiseptic. There is no necessity for sterilizing the syringe after each injection, but a freshly sterilized needle should be used for each case.

Precaution to Be Taken before Operating on Wounds.—When about to operate at the site of a wound, although the latter be healed, unless the previous dose has been administered at a shorter interval than seven days, a prophylactic injection should invariably be given before operation. The precautionary injection should consist of a

[1] See THE MILITARY SURGEON, January, 1917.

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single subcutaneous injection of the ordinary prophylactic dose of 500 units, administered two days before operation and, preferably, intramuscularly. It takes forty-eight hours for the antitoxin to be absorbed when administered subcutaneously, and twelve hours, intramuscularly.

Precautionary injection before operation is necessary to ward off the possibility of lighting up dormant tetanus bacilli that may be buried in living tissues that are indifferent to their growth. It should be remembered that anaerobes, like tetanus bacilli which are saprophytic in habit, may live without propogating in clean wounds for two or three months, without exhibiting the clinical manifestations of the diseases which they cause when located in devitalized tissues. Hence the reason for precautionary prophylactic dosage to be employed when about to operate at the site of a wound.

Antiseptics Which May Be Used in the Preventive Treatment of Tetanus.—The memorandum next deals with the antiseptics used in the *preventive treatment.* It is well known that anaerobes grow with much difficulty in the presence of oxidizing agents like hydrogen peroxide, potassium permanganate, chlorine and solution of iodine, and for that reason clinicians have sought to locally treat the infection by irrigation and by injecting into the tissues weak solutions of these agents. The results have not been satisfactory.

Diagnosis.—The classical symptoms of tetanus such as trismus, risus sardonicus, opistothonos, etc., in those who have been treated by prophylactic injections of antitoxin, are very seldom seen. The clinical evidences of tetanus are confined to local spastic rigidity of the wounded part or limb, which may persist for weeks.

The importance of early diagnosis is emphasized, since all clinical and experimental evidence go to show that successful treatment diminishes rapidly with the length of time after the first symptoms have been observed.

Among the earliest symptoms of tetanus are spasticity and increased reflex excitability of the muscles near the wound. In these cases the toxin reaches the spinal cord primarily by the nerves which are connected with the seat of injury and therefore the motor nerve cells which govern the muscles about the wound will be the first to be affected. Spasticity and rigidity may precede the other symptoms of tetanus by many hours. For this reason, the assistants and dressers are enjoined to report the first occurrence of rigidity, twitching, or local increased reflexes which may be provoked in response to gentle tapping or pressure, to the surgeon in charge. Other early symptoms of diagnostic value may be "anxious look, pain in back or neck, sore throat, general restlessness, unreasonable outbursts of temper, insomnia, violent head-

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ache, excessive yawning, complaints of spasm in the limb injured, stiff neck, difficulty in swallowing without recognizable cause, stitch in side, profuse local or general sweats, and difficulty in micturition.

Therapeutic or Curative Treatment of Tetanus.—Success in therapeutic and curative treatment after the onset of symptoms depends on properly administered intrathecal injections of antitoxin, given as soon as possible after the first symptom has been noted. An hour's delay may mean the difference between success and failure. Rigidity and hardness of the muscles around the wound may be present for days or weeks before the occurrence of trismus. When the rigidity appears it will not do to employ the slow method of absorption of the antitoxin by the subcutaneous or intramuscular method. An intrathecal injection should be made.[2]

In a paper, *Sur le Tetanos, post serigues et en particulier sur le Tetanos sans Trisnus.* Par le Dr. Montais (des Silas) Aide Major de 1're clase. Anneles de L'Institut Pasteur T. xxx, 1916, Juillet, No. 7, the author helps to clear up the subject of local tetanus very materially. He has collected twenty-one cases, from French sources, of well-defined local tetanus without trismus and a number of other cases in which trismus supervened later. All of the cases occurred in persons who had received the prophylactic dose of serum by injection.

Montais says that the first case of local tetanus was observed in 1913, that the form of tetanus which begins locally and ends in trismus has long been appreciated, but the form which is designated as local now is a pathological novelty, and that it is the outcome of serotherapy.

Dr. Montais distinguishes four degrees of tetanus: (1) The tetanus which remains localized in the region of the wound, the pontine and bulbar centers escaping altogether. This is the, strictly speaking, local tetanus and it occurs almost entirely within the first month after the prophylactic dosage. The incubation may be only a few days, but in one case it was three months. Only two of the reported twenty-one cases died. (2) In the second group, more frequently seen than the first although local in its onset, there is evidence that the higher centers are not completely protected because, after the lapse of days or weeks, trismus and other general symptoms appear, more often of no great severity. The mortality, as one might suppose, is higher than in those of the first group. (3) In the third group the onset is usually from the second month onward; the protection of the higher centers is much less. Trismus, cervical rigidity and others of the well-known general symptoms of tetanus are noted; the local onset in the injured member is no longer

[2] See The Military Surgeon, January, 1917, p. 119.

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seen, or at least it is no longer sufficiently present to attract attention. In this group it would seem that there is yet some slight degree of immunity to modify the severity of the symptoms. The crises are not so severe as found in one entirely unprotected and the spasticity shows a tendency to persist. The mortality is from 33 to 50 per cent. (4) In the fourth group there is no evidence of protection and the tetanus is of the ordinary type.

Montais tells us that the tetanus bacillus is found in wounds usually in the form of spores and these may germinate, liberating toxins up to many months after implantation. The dormant spores may be awakened long after the effect of the prophylaxis has disappeared.

Finally he submits the following question: Why should early tetanus in the protected man assume the local form? His answer is both ingenious and plausible. It is generally understood that the central nervous system is invaded by the tetanus toxin by way of the peripheral terminations in the muscles, the channel being by way of the motor nerves. It is for this reason that the involvement of the spinal centers corresponds to the site of the wound. In the unprotected man simple local tetanus practically never occurs. In him the centers in the pons and medulla are the first to be attacked, because they are more susceptible. The route to the centers in the pons and medulla is a roundabout one, by way of the blood stream, unless the wound and focus of infection are situated adjacent to the cranial nerves. In the man who is protected, the higher centers, beyond the spinal ones, are shielded by the antitoxin circulating in the blood, while the spinal centers are immediately accessible to the toxin in the wound. Montais believes that early local tetanus is the result of immediate and copious outpouring of toxin from the wound, at the same time that, in the protected man, the higher centers are receiving protection from the antitoxin in the blood stream, otherwise the case would resolve itself into one of the regular type with a rapidly fatal issue. In the simple local forms of tetanus the mortality is low because the prognosis depends upon whether or not the higher centers are attacked. Unless protection is kept up as already recommended, the shield afforded by the antitoxin gradually wears away, trismus and other general symptoms appear, and the disease runs its customary course.

LOUIS A. LA GARDE.

RED TAPE

Webster defines "red tape" as "the tape used in public offices for tying up documents, etc., hence official formality and delay." In the mind of the uninformed it is usually defined as anything in the way of

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records they know nothing about and, hence, useless. If one would take the trouble to study, superficially even, the interior economy of a large department store, he would no doubt be amazed at the details and the extent of the necessary records thereof. Take, for example, the record of a paper of pins in such an institution, first, an order to the manufacturer; second, the receipt at the warehouse, including bills of lading for transportation, the entering in stock-book, etc; third, the transfer to the sales department; fourth, the sale to a purchaser involving the making out of duplicate memo. invoices by the salesman, the forwarding of cash to the cashier, the notification to the shipping-out department, the sending of the pins to the purchaser's address, the checking up of the salesman's book, the entry in the various books pertaining to the bookkeeping department, the depositing of the money in the bank. If an error involving a single cent develops, a corps of experts is put to work to find it, and finally the paying of the manufacturer for his pins and distribution of the profit to the storeowners. Probably there are other steps, but those detailed are necessary and indicate the minutae of a well-regulated business. All of this would be quite unnecessary if the affairs of the institution involved only the disposal of a single paper of pins, but when an infinite number of transactions occur, without such records the business would be chaotic, and foredoomed to failure.

If such would be the case in a comparatively insignificant undertaking, how much more so would it be in an army embracing great numbers of men and a multiplicity of matériel?

Take for illustration the records of the Medical Department, which, we are told, appear so intricate to those unfamiliar with them. We question if they are any more so than the records of the hypothetical department store above described, which any intelligent man would hesitate to say he could not fathom. Indeed we believe they are less so. Would the chaos be any less in the one than the other, without records? Of course no one has an intuitive knowledge of the records of a department store any more than of the Medical Department; both must be learned by theory and practice.

Upon the subject of "paper work," our esteemed collaborator, First Lieut. Henry C. Coe of the Reserve, writes us as follows:

"Reports are the acknowledged stumbling blocks of the untrained medical officer, both of the National Guard and the Medical Reserve Corps. He is appalled at the list in the Manual of the Medical Department, and gains only a theoretical knowledge of them through the correspondence course. Many an officer, whose work is favorably noted by the Sanitary Inspector, comes to grief in his efforts to bring

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order out of chaos in his reports. An officer of the Medical Reserve Corps, of more than usual efficiency as a regimental surgeon and sanitary expert, was reduced to despair in preparing his list of sick and wounded, and even the register cards are often made out several times before they are correct. Reports are especially hard to the older men, who long since have ceased to bother their heads about records and leave them entirely to the office. An experienced sergeant is a tower of strength to the raw medical, as well as line, officer, but he is not always at hand. Some men are 'sharks' at figures, like the statistician of an insurance company, while others are paralyzed at the mere thought of the minute details demanded in an ordinary medical report.

"As for sending in a correct requisition for supplies, we are afraid that the pockets of not a few embryo medical officers would be depleted if they did not have an experienced eye to overlook them.

"There is a reason for everything in the service and instead of kicking at existing conditions, the conscientious officer will set himself to master details that may seem unnecessary to him, knowing that they represent the combined thought and experience of older and wiser heads than his.

"None the less, inexperienced medical officers, who have been reduced to the verge of melancholia by errors in their reports, will hear with a sigh of relief, the rumor that the Surgeon General's office is contemplating a change whereby the existing method of paper work may be simplified.

"Meantime, if a man knows that this is his weak point, it is up to him to concentrate on it."

THE CARE OF THE SOLDIERS' FEET

Major Corbusier's admirable report on his experiences with the feet of the Plattsburgers, published in the last November MILITARY SURGEON, has awakened an interest in the subject which promises to be of real military value to the country.

At the December meeting of the New York Division, Association of the Medical Reserve Corps, Major Corbusier presented a paper on "The Soldier's Foot and Shoe," which was quite generally discussed and upon which First Lieut. H. J. Boldt, M. R. C., submitted the following:

"Intellectual equilibrium—indeed the entire mental progress of civilization—is very largely dependent upon physical well-being. And in no small degree physical well-being depends upon a normal condition of the feet and their correct envelopment. Improperly fitting shoes—styles that do not conform with the natural and normal form of the foot—bring about more or less pedal deformity. Fallen arches, bunions, corns, ingrown nails—all these almost without exception are attributed to such footwear.

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"Then, too, we have a variety of symptoms distant from these extremities which may be caused by some pathologic condition therein. For instance—often interpreted as rheumatic—pains in the calf of the leg, radiating to the knee and even to the vertebral column, not to speak of the large variety of symptoms that are, or may be, caused by a fallen arch.

"Let us remember that the normal position of the foot is absolutely straight; pointed neither outward nor inward. This straight position of the foot throws the weight of the body upon the foot's center, which transmits it from the heel to the ball while walking. During slow walking the heel is still in active use; but during running the entire weight rests upon the balls. The uncivilized non-shod tribes, always carry their feet straight, and the same practise may be observed in young children.

"The more the feet are turned outward in walking, the more will the weight of the body be thrown backward and inward. It is then no longer on the center of the arch, as it should be, but on the inner side of the heel. And this, from an anatomical point of view, is the weakest part of the foot, and the part least suited to carry the weight of the body. It is obvious, therefore, that if the feet be always directed outward, the body will not be properly supported and pain in the extremities must ultimately result.

"A line drawn from the great toe to the heel of the normal foot is perfectly straight. Standing or walking, if the carriage be correct, the lines on the two feet will be parallel, veering neither outward nor inward. In the habit of turning the feet much outward in walking, the foundation of most foot ailments is laid.

"When the weight of the body is thrown on the inner side of the heel, the ankle bones, likewise, have a tendency to incline inward, thus forcing the muscles and tendons of the arch into a position in which they can give it but little support.

"Besides the central arch vault, there is an additional minor arch, extending from the first to the fifth toe, to which little or no attention is paid. The majority of persons, indeed, are ignorant of its existence. This, although in a smaller degree, is frequently the cause of foot ailments, because when weakened, it sinks just as does the main arch.

"The feet of soldiers do not differ, of course, from other feet, except in that they require still more scrupulous attention in order that the fatigue of long marches may be reduced to the minimum. Therefore, of prime importance is the matter of cleanliness. If at all possible, a thorough washing of the feet should be practiced daily. They should then be dried and bathed with alcohol to harden them. Feet that perspire too freely should be soaked for about fifteen minutes daily in

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a solution of chromic acid, 1–3,000. A properly fitting shoe—one that fits anatomically, the toe-end and the heel forming a straight line—is most essential. By personal experience I have found that a shoe so shaped that the toe-end leaves the straight line and turns outward is impossible for prolonged walking.

"The footwear that is supplied by the Government to soldiers, has, so far as I have seen, the correct shape—a straight line from toe to heel.

"For wear inside the shoes, I do not consider socks the best. The foot cloths that are used by soldiers in many parts of Europe, particularly in Germany and in Hungary, are far superior to socks for long marches. A square piece of heavy linen or muslin, smeared thoroughly with tallow—provided the care previously spoken of, has been taken—will enable a soldier to march much farther without feeling discomfort than can one who wears socks. When it is possible the tallow should be melted and the foot-cloths dipped into it. After being hung out for the tallow to harden the cloths are ready for use. Many times, as a boy and as a young man, I have tried this when wanting to take exceptionally long walks, and I can vouch for the efficacy of this suggestion. The shoes, of course, must be proportionately roomy."

This discussion is most timely, for the care of the feet, from the standpoint of efficiency in carrying the body, is apparently receiving but scant attention from our people, *vide* the woman's shoe of the day, than which the man's shoe is but little better. Then, too, the feet are not being used, for, between elevators, motor cars and other means of making life easy, our nether extremities are becoming more and more useless—with the possibility that nature will ultimately eliminate them.

However, nothing has yet been found for the soldier as a substitute for feet, and their care is a constant source of solicitude to his officers. The *München Med. Woch* for September last, published under "Military Surgery" an extended article on "Care of Feet in the Army," in which a series of developmental exercises for the prevention of flatfoot and other disabilities of the lower extremity is presented and suggestions are made also for the care of the skin and nails, and for the proper clothing for the feet under various conditions of weather and temperature. Recently, in our service, more than passing attention is being given to the military foot, both in the abstract and concrete—Munson's last is ideal and the quartermaster's shoe the best military footwear extant.

Unfortunately, most of the feet are spoiled before we get them, owing to ill-shaped shoes, but, nevertheless, the military authorities are doing much to improve the marching capacity of our soldiers.

If the profession will carry on a campaign of education, such as the New York Division has so well begun, it may be that the feet of the nation will be preserved for their legitimate purpose.

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BOOK REVIEWS

MILITARY SURGERY, by Dunlap Pearce Penhallow, S.B., M.D. (Harvard), Chief Surgeon American Women's War Hospital, Paignton, England; Captain Massachusetts National Guard; First Lieut. M. R. C., U. S. A. (inactive); with an introduction by Sir Alfred Keogh, K. C. B. Henry Frowde, Oxford University Press, London, 1916.

Dr. Penhallow's book is an octavo volume of 432 pages containing 151 illustrations which graphically portray the projectiles and the wounds they have caused in the present world war. The book is destined to take rank among the leading works which deal with war wounds. The author's opportunities have been rich in experience, and the arrangement of the matter at hand is excellent.

The part which deals with wounds is devoted entirely to traumata from projectiles and not from swords or bayonets. The latter are so rare that they are negligible, notwithstanding the accounts of hand-to-hand encounters which we frequently see in the press. The combatants in these struggles are nearly all killed, and this may account for the few cases of bayonet wounds found in hospitals.

The excellent condition of the men in the present trench warfare, when wounded, is commented upon. This is in marked contrast to the condition of men in active campaign, who may have been exhausted by forced marches, in all kinds of weather, scantily supplied with food and water. The condition of troops under these circumstances has long figured as a factor in battle mortality because of lowered general and local resistance of the men against infection.

To us who constantly picture the horror of trench warfare, it is reassuring to learn that "a large proportion of gunshot wounds cause relatively little injury and do not give rise to any great amount of shock or collapse unless the injury be extensive or unless viscera, vessels, or bones are involved."

Like all military surgeons of experience the author notes the ease with which hemorrhage can generally be controlled from projectile injury to blood vessels, and he very properly calls attention to the necessity of placing a nurse or orderly on duty over those cases which must have hemorrhage treated by the aid of a tourniquet. Carelessness in the use of tourniquets and the bad results therefrom when they are left in place longer than one hour, without letting up on the pressure, is common in the experience of field surgeons. Unless the tourniquet is loosened from time to time and the wound allowed to bleed, the circulation will be cut off and gangrene will occur. This is a difficult lesson to teach to members of the relief corps, who are apt to regard all bleeding as alarming and of a fatal kind. The unsurgical practice of attempting to control hemorrhage by packing the wound is very properly condemned. Military surgery is the last place where this method should be practiced, for the reason that the unclean bullet has penetrated unclean clothing and unclean skin, and that sepsis from these has been scattered broadly into the tissues, which are often devitalized

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and dotted with hemorrhagic foci, conditions which greatly augment the development of all kinds of pathogenic microbes.

Like all medical men who had not stopped to consider the effects of the energy of high power military rifles in transmitting infection in the tissues, and therefore overlooked this important factor, Dr. Penhallow's experience with war wounds has taught him its importance, for he states: "It was thought that with modern methods of antisepsis and first-aid dressings, combined with high velocity projectiles, infection would be reduced to a minimum. Unfortunately this has proved not to be so, and the present war has taught the military surgeon many things regarding wound infection, and has also caused the reasoning man to readjust his ideas." The old notion held by many surgeons "that the fate of the wounded man rests with the one who applies the first dressing" was based upon the false view that heated bullets are clean while inflicting a wound, and the absurdity of using a first-aid dressing to make a dirty wound clean. Thanks to the labors of the experimenters, the dangers of sepsis in all classes of rifle wounds, with bone lesions especially, were pointed out long ago, and the impotence of skin-deep disinfectants and first-aid field dressings, to in any way mitigate infection that had been forced into the wound by the projectile, has been noted repeatedly.

The rôle played by the anaerobes in wound infection in the present war is interestingly told. Chief among these are the Bacillus of tetanus and the Bacillus aerogenes capsulatus of Welch. We rather regret to find an American writer from Boston refer to the Welch bacillus as the *Bacillus perfringens*. Those familiar with the history of this bacillus know that Welch first reported his observations upon it in 1891 to the Johns Hopkins Medical Society, and that he reported in full the character of the bacillus in the July-August number of the *Johns Hopkins Bulletin* for 1892. Fraenkel[1] described the same bacillus in 1893, and called it Bacillus phlegmones emphysematosae. Fraenkel's name for the bacillus could not prevail, since it is a rule, in biological discoveries, to apply to an organism the name which was conferred upon it by its discoverer. For that reason the name Bacillus aerogenes capsulatus was commonly given to the organism until Veillon and Tuber, some years later, described the gas-producing bacillus of Welch, and they called it Bacillus perfringens.

The war in Flanders and northern France has brought the pathogenesis of the Welch bacillus very prominently before the medical world, and the credit belonging to the discoverer of the Bacillus aerogenes capsulatus should not be dimmed by the freakish notion of one who, laying stress on the mechanical tendency of the organism to force itself through obstacles, would rename it accordingly.

Dr. Penhallow takes occasion to state that many wounds, and especially simple bullet wounds, heal without giving rise to any clinical evidence of infection, "nevertheless it is safe to say that all gunshot wounds are infected to a greater or less extent and that the severity of the infection depends on certain factors: (*a*) the amount of trauma caused by the projectile; (*b*) prevalence of

[1] Central bl. f. Bakter, xiii, p. 13.

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the micro-organism contaminating the wound; (*c*) resistance, both local and constitutional."

The pyogenic organisms come next in importance and among them streptococcus fecalis is the most frequently found. This is ascribed to its universal presence in the terrain which comprises the intensive farming district of the western front. Staphylococci, bacillus pyocyaneus and the colon bacillus are next in order of frequency.

It has been noted before, and Penhallow again calls attention to the lack of virulence of the pyogenic organisms in war, as compared to those found in the infected wounds in civil hospitals. This may be due to the resistance of the men, but more likely it is due to the attenuated condition of the bacteria, acquired by remaining a long time in the clothing or in the earth. In civil hospitals, in spite of good antiseptic detail, pyogenic organisms are apt to acquire virulence by accidental transplanting from host to host.

One of the phases of infection which has been pointed out in this war, refers to the quiescent bacteria which remain in the tissues after healing of a wound, and which may later light up into a virulent sepsis. This may be the result of lowered resistance by reason of wounds or other traumata. The author warns against undertaking an operation on any healed wound, especially those involving nerves, or about a joint, or blood vessels and tendons, until the expiration of three months from the time of healing of the wound. Likewise there is danger in too early massage and passive motion, in the neighborhood of a joint.

Attention is also called to the dangers of lighting up tetanus in healed wounds, by disturbing buried tetanus spores, in the tissues, during secondary operations. He mentions the occurrence of local tetanus in a case where it became necessary to correct some deformity in a limb. The patient had received multiple shell wounds in October, and two months later it became necessary to place him under ether, to overcome contracture of his forearm and to correct some malformation of his leg. A week later he developed trismus.

The patient had received an anti-tetanic dose of serum when first injured, but his immunization had commenced to disappear, when the disturbance of the tetanus spores, buried in his injured tissues, again found pabulum; thus converted into the vegetative form, they threw out toxin, and give rise to local tetanus. This was promptly checked by administering 1,500 units of antitoxin serum intravenously. It would have been far better to have given the patient a prophylactic anti-tetanic injection two days before the secondary operation, as recommended in the current issue of THE MILITARY SURGEON in a review, by the writer, of the present status of local tetanus. No operation should be performed on an immunized or partially immunized man, among the wounded in a war hospital, without preceding said operation by a precautionary prophylactic dose of antitetanic serum, unless the first dose has been administered less than seven days previous to the time of operation. Immunization, as a result of anti-tetanic serum, lasts only ten days after the first injection.

The Bacillus aerogenes capsulatus likewise may lie latent in a wound which has been thoroughly healed, then later may be liberated and multiply as a result of traumatism of the surrounding tissues, by operative procedure,

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and show all the evidence of an acute infection. Dr. Penhallow details a very interesting case of this kind resulting from an attempt to remove a lodged ball, two months and one day after the receipt of the original injury, and after the wound had healed.

The following classification of wounds by projectiles is adopted by the author: (1) wounds by hand weapons; (2) wounds by artillery; (3) wounds by grenades, bombs and mines.

It is interesting to note that 55 per cent of the wounds treated at the A. N. War Hospital were caused by rifle bullets. Doubtless the majority of them were fired from machine guns, since the latter and the military rifle use the same ammunition. In the Civil War, 1861-5, the percentage of hits by rifle and pistol balls was 91.1; by grape shot, grenades and shrapnel, 8.9. In the Franco-Prussian War, 88.7 and 11.3. In the Russo-Japanese War: Japanese, 83.5 and 13.5; Russian, 84.5 and 14.5. If trench warfare in Europe is now giving 55 per cent of wounds by rifle projectiles and the remaining 45 per cent of wounds, approximately, are being inflicted by shrapnel, shell fragments, etc., this mode of warfare, in so far as the percentage by projectiles and the characteristic features of the wounds are concerned, does not differ in results much, from those noted in the Crimean War, 1853–56, during which troops fought mostly behind entrenched positions. Out of 34,306 wounded among French troops, Chenu reports 53.4 per cent of casualties by rifle and pistol bullets, 46.6 per cent by the artillery arm.

The fifth chapter, on treatment, is of much interest, showing the advances that have been made in the treatment of wounds in this war.

Wounds are first treated, at the front, antiseptically, by a protective dressing, and all wounded men are given an injection of anti-tetanic serum. The antiseptic used varies. The more simple wounds are painted with tr. iodin or they may be washed with acid carbolic, 1-20 or 1-40. Large wounds may require the use of an anesthetic, the tissues which are devitalized are removed, and the wound scrubbed with carbolic acid or tr. iodin. Accessible foreign bodies should be removed and the vessels ligated when necessary. A dressing of gauze, treated with bicyanide of mercury, is then applied.

The subsequent procedure, at the base, resolves itself into the treatment of (1) clean wounds, or (2) infected wounds.

The so-called clean wounds are those of soft parts made by bullets or small shell fragments, that usually heal readily after the application of a first-aid dressing, preceded by painting the wound and surrounding skin with tr. iodin.

The treatment of infected wounds, at the base, is invariably preceded by a bacteriological examination of the discharges from the wound.

It is the aim of the surgeon, whenever possible, to apply "a dressing which will have a marked bactericidal effect upon the prevailing organisms and one which will *penetrate into all the recesses of the wound, and thus reach the foci of infection.*" (The italics are ours.)

The next most important step in the treatment of infected wounds, at the base, is the establishment of adequate drainage and, next after that, dressings, antiseptics, salines, baths, compresses, foments, etc. Here the author de-

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scribes in detail the methods of treatment advocated by both Wright and Carrell, both of which are used in the A. W. War Hospital, almost to the exclusion of other methods. The author states that as to the relative values of the hypochlorous acid and saline solutions, there is doubt as to which produces the best clinical results. Penhallow is partial to the use of hypochlorous acid for gas bacillus infections, but in the treatment of other infections he states: "We are still undecided as to whether we get better results with hypochlorous acid or with saline solutions, though from comparative studies of the two methods we are beginning to be slightly more in favor of the saline solutions." We give the author's exact words as to his idea of the merits of the two methods which are now so prominently before the profession, because his statement is one of the first which we have seen in print on the comparative value of these procedures.

Under "Secondary Hemorrhage" the author warns of the danger of digestive ferments which have great tendency to erode vessels in infected wounds, and the danger of through and through drainage tubes, in perforating wounds of limbs, is referred to. These, by contact with a vessel, become more dangerous than the original missile which inflicted the injury.

Secondary hemorrhage should be treated without temporizing, by prompt ligation. It is dangerous to pack infected wounds and especially those in which secondary hemorrhage is taking place. Violation of this rule may have given the notion that packing infected wounds with gauze, impregnated with salt solution, promotes a tendency to secondary hemorrhage. Gauze packing with any disinfectant is a dangerous surgical procedure in an infected wound, since packing increases the possibility of spreading infection through a larger area. As the infection spreads it involves the vessel coats, and hence the tendency to secondary hemorrhage.

The pages of this book contain many valuable illustrations showing the beautiful results which have been obtained by the use of primary and secondary suture after the plan recommended by Dr. H. M. N. Grey in the *British Medical Journal*, August 28, 1915.

The treatment of infection from the bacillus aerogenes capsulatus (called bacillus perfringens by the author) comes in for specific mention. An attempt should be made in the beginning of treatment to ascertain the bacteriology of every wound; but the lack of such an examination should not deter anyone from treating, in a radical way, all wounds which may be suspected of containing bacillus aerogenes capsulatus.

The following signs are very suspicious of infection by the gas bacillus of Welch. The wound presents a dirty sloughing appearance, a dirty serous exudate escapes from it, bubbles of gas, crepitation under the skin is felt, and a faecal-like odor eminates from the discharge; the adjacent tissues are reddened as in cellulitis and they are oedematous and tender. There is evidence of toxemia, and this is apparently out of all proportion to the apparent severity of the wound. The skin is cold, pale and clammy; the pulse is weak and rapid, the temperature becomes higher and higher, and delirium and death soon supervene.

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The infection by the gas bacillus may be divided into three groups, and on the recognition of this fact the plan of treatment is decided upon: (1) A wound in which there is purely local infection, recognized by the bacteriological findings, the dirty appearance of the wound and the characteristic odor; (2) A wound with a spreading cellulitis, with tendency to toxemia and other evidences mentioned under (1); (3) A wound in which the traumatism involves disturbance of the circulation, like the severing of an artery, with devitalization of the parts. The signs in (1) and (2) groups are all present but greatly intensified. In this group cases of typical gas gangrene occur.

As to treatment of wounds infected by bacillus aerogenes capsulatus, as soon as the diagnosis has been made, or the presence of the organism is suspected the patient is etherized, the skin surrounding the wound is shaved and painted with tr. iodin. Slough, traumatised tissues and necrotic areas should be cut away and the wound swabbed with carbolic acid followed by alcohol or iodin. The wound is then dressed with gauze soaked in hypochlorous acid solution or chlorinated soda. If cellulitis is present, all infected points should be freely incised and free drainage used in the wound proper, by the employment of rubber tubes, rubber tissue, or gauze.

Amputation by circular flaps should be performed in extensive wounds of the upper or lower limbs, and the wound should be left wide open.

Wounds infected by anaerobic bacteria do better when they are freely exposed to the air. Peroxide of hydrogen and other antiseptics have been used in these infections, but free incision and drainage, followed by continuous bathing with hypochlorous acid, seem to give the best results. Later, when the wound has become comparatively clean and the infection is subsiding, the author resorts to the saline solution.

Internal splinting by bone plating or grafting in the treatment of fractures with sepsis has never been a popular method of treatment and, until the present war, it was not advocated by anyone to our knowledge. Dr. N. C. Lake in the *British Medical Journal*, 1915, ii, 44, wrote a valuable contribution on the subject, in which he argued that in certain cases the method could be used to advantage. Dr. Penhallow maintains that the procedure has been too sweepingly condemned, and that under certain conditions it is justifiable. The author has had fifteen cases of plating without a failure.

Of course judgment is necessary in the selection of a case suitable for treatment by plating. The method is indicated in cases with marked deformity and overriding of fragments, with little comminution, and in which reduction and fixation, in proper alignment and position, can be obtained in no other way.

In compound fractures with much comminution, in which there is no deformity, and when allignment is easily accomplished, the old method of immobilization, removal of loose fragments, and ample drainage, may be pursued with advantage. Of course, in all gunshot fractures, union and return of function are a matter of many months at best, regardless of the method of treatment employed.

The objection that plates cause necrosis is true, but necrosis takes place in the other methods of treatment as well, and it is claimed that necrosis due to

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the presence of a plate is limited. The author's conclusions are summarized as follows: (*a*) Even if an infection be present in the wound, union will take place; (*b*) removal of the plate is indicated as soon as there is any callus formation, and this is an important point, as callus will not form at the site of the plate, but will form everywhere else; (*c*) adequate drainage should be established in all cases, not only of the soft parts, but of the medullary canal itself; (*d*) better alignment and position are obtained from the very beginning with less resultant deformity; (*e*) convalescence is not protracted much, if at all, beyond other cases.

Entogenous bone grafts are employed successfully in cases of partial or non-union. The presence of the graft is supposed to have an osteogenetic effect and, as a result, a firm bony union takes place within a very short time.

It is safer to wait until all healing has taken place, and for some time thereafter. Otherwise the operation for the placing of a bone graft will prove a failure, by lighting up latent infection.

The method used in the American Women's War Hospital is that advocated by Albée in his work on Bone Graft Surgery, the technique of which is so well known that it need not be referred to here.

The chapters on head, face, neck and trunk injuries afford much of value and interest to the military surgeon. We wish to congratulate Dr. Penhallow upon his valuable contribution to our knowledge of a branch of surgery that was considered ancient history only a very few years ago.

LOUIS A. LA GARDE.

AMERICAN PUBLIC HEALTH PROTECTION, by Henry B. Hemenway, A.M., M.D. Indianapolis: Bobbs-Merrill Co., 1916. $1.25 net.

It is a worthy attempt to educate the general public in important problems relating to the public health and the administration of health matters in America.

While no doubt many health officers of the smaller communities could read its pages with profit, the book has been written in a more or less popular style chiefly for the laity.

Though there are numerous statements made that are open to question, if not actually erroneous, with especial reference to the chapter on National Health Agencies, these inaccuracies are of no great importance in so far as the general value of the work is concerned, and would hardly be perceived by anyone outside of the Medical Services of the Government. It would not be fair to scrutinize a book of this character with the same attitude that would be taken toward a scientific treatise written for the education of the profession.

The statements made regarding certain subjects in the book are at best no more than the author's opinions, and while entitled to due respect are not of necessity the last word on the subject, more especially as there is a lack of unanimity of opinion among sanitarians and health officers generally on these very subjects. The matter of school inspection is an example of this. According to this book the work of medical inspection of schools should be operated and controlled by the school management. While still an unsettled point, as is

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evidenced by the different practices that obtain in various localities, it is believed that the opinion given is at variance with that held by the majority of sanitarians and health officers, as well as the medical profession in general. It is manifestly hard to understand why the medical inspection of schools, admittedly inaugurated and conducted as a public health measure, should be divorced from that part of the local government created to carry out measures for the protection of the public health, and be placed under the supervision of the pedagogical system, whose members are not qualified by training to best administer it.

In the chapter on Medical and Sanitary Education it is stated that a training in zoology, though requisite for a public health worker, would be useless for the general practitioner. This statement is believed to be legitimately open to question. It would most certainly do the medical practitioner no harm, and nowadays might be found useful at any time. It would at least make him a broader man, and probably a better and more accurate diagnostician as well.

The "ordinary practitioner of medicine" is rather hard hit at times in this book, but not altogether without reason; and it would be for the good of the ordinary practitioner's soul if he could but, in sufficient numbers, read the pages.

The chapter on the Organization of Health Departments is the best in the book. Here are discussed and shown in the most convincing style, the increased efficiency and other advantages which a system of full-time County and Municipal Health Officers with full responsibility, has over the cumbersome Board of Health system that so largely prevails in this country. The defects in the system wherein a practicing physician is a part-time health officer are likewise plainly pointed out.

A chapter is devoted to the Preparation of Public Health Officers. In it a strong and timely plea is made for adequate and more practical means in the higher educational institutions, whereby health officers and others may receive scientific instruction in hygiene and other subjects relating to public health, and receive appropriate academic recognition for the work they have done both in the school and the field.

On the whole it is believed that Dr. Hemenway's book, American Public Health Protection, fills a niche previously unoccupied by kindred literature, and it deserves to be widely read by those for whom it is written.

J. R. HURLEY.

GERIATRICS, THE DISEASES OF OLD AGE AND THEIR TREATMENT, INCLUDING PHYSIOLOGICAL OLD AGE, HOME AND INSTITUTIONAL CARE, AND MEDICO-LEGAL RELATIONS, by I. L. Nascher, M. D. Philadelphia: P. Blakiston's Son & Co.,

This is an exceedingly interesting book and in the scope and treatment of its subjects unique in American medical literature; it will well repay careful perusal.

The author's basic idea is that "senility is a physiological entity analagous to childhood and not a pathological state of maturity;" on the other hand he shows that senility is not at all a "second childhood," the process of senescence

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is progressive, not retrogressive, there is no reversal in the order of development, and not a single tissue reverts to an earlier type.

"While the fundamental difference between the young and the old organism must be sought in some essential change in the character of the cell, the fundamental difference between childhood and old age can be summed up in this: Youth wants to know; age wants to be."

The author describes first physiological old age and then pathological old age.

He states his theory of the cause of senescence as follows:

"I believe that there is a progressive evolution in cell life; that newer cells differ from their predecessors; that at one stage of this evolution the cells are most perfectly adapted to their surroundings and their available nutrition; that at this time the cells are in the most perfect condition to perform their functions; that later cells are less perfectly adapted to the conditions under which they exist; that under these circumstances fewer and more imperfect cells are formed; that finally the cells are so imperfect and so poorly fitted for the conditions under which they exist that they either do not reproduce or else the organs which they form cannot perform their functions. Furthermore, different kinds of classes of cells have different stages or periods of evolution, but tissue cells of the same kind pass through the same stages."

The diseases of old age are divided into five divisions: primary senile diseases, secondary senile diseases, preferential diseases of old age, modified diseases of old age, and diseases uninfluenced by age. There is added a chapter on hygiene and medico-legal relations.

CHAS. F. MASON.

INTERNATIONAL CLINICS. Vol. 4, Twenty-sixth Series. J. B. Lippincott Co., 1916.

As usual, this volume comes with much of interest and covers a large field: Medicine, Pediatrics, Obstetrics, Neurology, Ophthalmology, Genito-Urinary, Public Health and Surgery.

All of the articles are timely and well written. Of special interest because so rarely considered, besides being very instructive, is an article by Dr. Paul C. Bowers on "The Psychology of the Criminal under the Sentence of Death."

An article on a condition which every practitioner meets more or less frequently, is of special value and suggests relief for a class of suffers that are too often passed on from one to another without relief, and finally become more or less chronic invalids. This article, by Dr. P. B. Magunson, on "Backache—Some Disputed Points in the Mechanics Thereof"—a somewhat misleading title, as the treatment is fully discussed as well as the mechanics—is well worth careful study.

The subject matter is dealt with throughout in a concise manner and there is little superfluous, to take up time needlessly. The illustrations and press work are excellent. The book will commend itself to the up-to-date doctor.

GEO. A. SKINNER.

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THE ANNUAL REPORT OF THE U. S. PUBLIC HEALTH SERVICE.

Surgeon General Blue's report for the fiscal year 1916, recently received, is a comprehensive document of more than usual interest.

Owing to the war abroad and the troubles in Mexico, stupendous efforts have been required to prevent the entrance, within our ports and across our boundaries, of those communicable diseases which invariably follow in the wake of the wholesale destruction of human life and the impoverishment in health of the living, through war, such as is occurring in Europe and in Mexico at present.

We have been threatened with typhus fever both from the Mexican border and abroad by vessels coming from infected ports. A severe epidemic of this disease was rampant in Europe, particularly in the Balkan States, while in Mexico it is endemic. Then, too, an epidemic of cholera prevailed in Germany and Austro-Hungary, and to a lesser extent along the Mediterranean seacoast. Plague, also, was en route to invade us at different times during the year, nor did yellow fever fail to make attempts to gain an entrance. It is due to the excellent organization and eternal vigilance of this branch of the national service, that none of these dread diseases succeeded in gaining a foothold within our boundaries.

The report goes into detail in describing the methods used and means adopted for excluding these and other like unwelcome visitants, and these details make very interesting and instructive reading.

In addition to the tremendous labor required to keep these diseases out, equal effort had been called for to cope with epidemics originating within our own borders. To this end, a campaign has been inaugurated to educate our people, both rural and urban, in correct methods of sanitation and proper living. The earnest coöperation of local health boards has been enlisted, numerous lectures have been delivered, lantern slides bearing on the subject exhibited, and appropriate literature has been freely distributed direct to the communities themselves. Moreover, the children at school have likewise been instructed in the principles of hygiene, etc.

In fact, the dissemination of sanitary knowledge throughout the country, wherever it would bear fruit, has been not the least of the many important labors the service has performed, in addition to its regular work. Even by itself, this educational campaign is a vast undertaking in so enormous a country as ours, but it is undoubtedly one of the best methods for bringing about the improvements desired, and it has been systematically and enthusiastically pushed with very satisfactory results, as shown in the report.

Pellagra, one of the comparatively newly studied diseases in this country, has been shown by the service to be largely due to faulty diet, and the communities in which it is prevalent are being systematically instructed as to the proper means of prevention. This will no doubt cause a marked decrease in the number of new cases in the near future, especially if the need of sanitation in connection with dietitics is duly impressed.

Trachoma has also called for vigorous handling, both within and from

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without the country, and is receiving it. Typhoid fever, malaria, and other diseases common to rural communities have been successfully battled with, and the outcome has been materially promoted by direct instruction of the people, giving them a proper understanding of the causes and methods of prevention of these diseases.

Infantile paralysis, tuberculosis, spotted fever, plague, etc., have all been handled in a masterly manner and successful efforts made to check their spread and prevent their recurrence.

The prevention of pollution of our rivers has also come in for a great deal of labor and study, and investigation and improvement are steadily proceeding.

Our island possessions, with the diseases peculiar to them, have also contributed largely to the work of the service.

Child labor; sanitary conditions in schools, particularly in rural districts; certain important industries, as mining, cotton mills and other industrial enterprises, have all claimed considerable of the time and attention of the Public Health Service, and their thorough probing and the improvements instituted have done much to better conditions.

In the fumigation of vessels, for the destruction of rats, roaches and other vermin, as well as disease-producing germs, cyanide gas has practically superseded sulphur dioxide and carbon monoxide. When properly supervised, as practiced by the Public Health Service, it is no more dangerous, is cheaper, more thoroughly efficacious and a great time saver, all of which are very important factors in maritime affairs.

One could go on, indefinitely, writing of the work accomplished by the service and described in this report. The foregoing simply enumerates a few of the important duties performed. Suffice it to say that there is no feature of sanitation left untouched, which might contribute to the welfare of the community at large. The work of the U. S. Public Health Service is ever exacting and never completed, as evidenced by this admirable brochure; but we can rest assured, from its excellent record in the past, that this work for the improvement of the public health will be continued in the same thorough manner in years to come, safeguarding our people and keeping sickness at a minimum by every available means.

GEORGE J. NEWGARDEN.

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ASSOCIATION NOTES

A meeting of the executive council was held in Washington, D. C., January 2, 1917, for the transaction of such business as might be brought before it.

After the reading and approval of the minutes of the last meeting, the secretary-editor *ad interim* submitted a report covering the activities of his office for the last six months and a list of applications for membership numbering 246, which follows:

Medical Corps, U. S. Army: Lieut. Col. George D. Deshon, Jere B. Clayton; Majs. William E. Vose, James F. Hall, George F. Juenemann, Walter D. Webb (retired), Frank Thomas Woodbury, R. M. Blanchard, Samuel L. DeLoffre; Capts. W. Cole Davis, Edw. Thos. B. Weidner, Leeson O. Tarleton, Joseph E. Bastion, Robert Skelton, Webb Earl Cooper, Douglas W. McEnery, George H. McLellan, Alvin W. Schoenleber, John Mitchell Willis, Thomas E. Harwood, Jr., W. D. Herbert, Leo C. Mudd; First Lieuts. Robert Henry Wilds, Harry D. Offutt, Herman G. Maul, Wilson C. von Kessler, Austin J. Canning, Walter P. Davenport, Louis H. Bauer, Charles R. Castlen, R. L. Harden, Lloyd E. Tefft; Con. Surg. Harry A. P. Neel (associate member).

U. S. Navy: Surg. Allan Earle Peck, Passed Asst. Surg. Frank E. Sellers, Asst. Surg. Gardner N. Cobb, M. R. C.

U. S. Public Health Service, Passed Asst. Surg. Marshall C. Guthrie.

Organized Militia: Majs. Samuel O. Billing, Ala.; John W. Watts, Ala.; Fred E. Miller, Ill.—Capts. Hector George Lareau, Okla.; Gustavus I. Hogue, Wis.; James W. Hamil, Ala.; James H. Blackwell, Ala.; Wm. W. Long, Ala.; Isham Kimbell, Ala.; W. D. Fonville, Ala.; Wm. A. Padgett, Ala.; Herbert H. Forcheimer, Ala.; Robert F. Ashworth, Ala.; Edward S. Sledge, Ala.; Boylston D. Smith, Ala.; Robert B. Beard, Ala.; R. C. Rush, Ala.; Wm. M. Peters, Ala.; Howard S. J. Walker, Ala.; Frank P. Auld, Ill.—First Lieuts. Theodore L. Hazlett, Pa.; H. O. Black, Fla.; L. A. Greene, Fla.; R. N. Greene, Fla.; Nathan S. Davis, Ill.; Wm. W. Hoyt, Ill.; Frederick H. Thorne, N. J.; A. A. Mitten, Wis.; Wm. Paxon Chalfour, N. J.; Harry B. Chalfont, N. J.; James B. Griffin, Fla.; John F. Capps, Okla.; Moses J. Ferguson, Okla.; Pliny R. Blodgett, Ill.; Byron S. Bruce, Tex.; Jesse R. Pawling, N. Y.

Medical Reserve Corps, U. S. Army: First Lieuts. John Goodwin Grimley, Frank Piper, John W. Burns, Guy S. Shugert, Walter Rupert Weiser, Walter S. Johnson, Joseph L. Bell, Forrest Joy Pinkerton, James Pedersen, Harry Thornton D'arc, Clarence E. Earnest, James R. Yocom, Reuben S. Simpson, Charles Henry Mitchell, Wm. C. Dieckman, Carey Judson Vaux, David N. Dabbs, Charles F. Stough, Alexander A. Brown, Maurice L. Puffer, Walter A. Ford, James Stevens Simmons, William James Elser, Robert E. Parrish, Horace Phillips, Lewis Brooke Hayden, Caleb Wesley Presnall, Clement A. Penrose, Cary Robert Pollock, Frederick Proescher, W. A. Frankland, Robert Lee Hall, Sidney Cohn, Harry A. Steckel, Joseph J. G. Williams, James D. McGaughey, Norman D. Morgan, Emile L. DeLanney, Walcott Denison, Cyrus B. Wood, J. M. Greer, Samuel Calvin Smith, Delbert E. Hoover, Edmund C. Boddy,

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Arthur E. Midgley, Evan O'Neill Kane, Walter Ashley Glines, C. E. Ruth, John A. Smith, Dean F. Winn, Peter L. Harvie, Louis J. Regan, Joseph McConnell, Louis Nelson West, Leo. W. Chilton, Edward A. Tobin, Garland Dix Scott, Bascom L. Wilson, James Earle Ash, Harold A. Benson, Edward A. Coates, Jr., John Lewis Mahoney, Charles Cross, Jonas Rhodes Longley, Paul Wilson, Leon Matassarin, Charles Le Baron, Coite Long Sherrill, Harry L. Arnold, Hugh J. Hagan, John Champlin, James C. Tucker, Arthur Mitchell, Albert J. Pullen, William L. Edmundson, Harrison J. McGhee, Vincent J. Irwin, Jr., E. A. Anderson, Henry G. Turner, Joseph Herbert Willis, Henry L. Krafft, Charles W. Hughes, Francis E. Weatherby, Michael R. Wilkinson, Reginald H. Meade, Alva Burton McKie, William Clark McKnight, John H. Kearney, O. A. Jones, John L. Moore, J. Harry Collins, Donald Erskine Baxter, Horace Curlin Hall, Emery Bowers Neff, Frederick Jas. Pate, Nathaniel Pope Breed, William Patrick Ryan, Henry B. Ingle, Daniel D. Hogan, Harry F. Byrnes, Paul Kurt Sauer, Charles H. MacFarland, Otto A. Kreml, Claren E. Pfeifer, Geo. Wm. Woodnick, Norman Randolph Price, Fitch C. E. Mattison, James Carlton Ferrell, Stephen A. O'Brien, Charles A. Fife, John Wesley Tope, Ingvold M. J. Hotvedt, Charles W. Selover, Albert R. Warner, John Morris Dodd, Edward Stuart Parker, Charles Ira Redfield, Harvey R. Gaylord, Irvin Hardy, Nathaniel R. Mason, Curtis A. Evans, Fred. Cecil Watson, Samuel Brister, Orlando H. Petty, Thomas Williams Jenkins, Douglas Walker Cairns, Benjamin T. Tilton, William Jesse McAnally, Raymond C. Hill, Frank William George, George G. Van Mater, N. F. Rodman, Frank Roxborough Ruff, Malachi R. Combs, Frank Farrow Simpson, Frank Edward Darling, Harvey Parker Towle, Oliver O. Alexander, Arvid E. Anderson, Henry Valentine Proeser, Frederick Gilbert Ritchie, C. Winfield Perkins, John Wesley Long, Joseph Grant Yocum, Martin W. Reddan, Charles B. Gibson, Edgar F. Haines, Newton G. Wilson, Wm. Rienhoff, Homer Beall, John Winfield Callnon, Gordon N. Morrill, Charles M. Thomas, Arthur Bliss Dayton, Jesse P. Simpson, Wm. Stephen Culpepper, Henry Lee Smith, Charles C. Ayres, Shadworth O. Beasley, Wm. Taylor Elmore, Wm. R. Cain, Samuel Bradbury, Wm. St. Clair Campbell, Edwin W. Knowles, Claude H. Ogden, Jesse L. Sloat, Emmett F. Cook, Hugh E. McGuire, Harry R. Foerster, Christian H. Koentz, Sigmund Bentsch, M. H. Kutch. Dr. Wm. M. Shedden (associate member).

These gentlemen were duly elected to membership in the Association.

The report of the committe of award in the Wellcome prizes contest, 1916, was submitted, together with the sealed envelopes of the contestants. Seven entered for the first and four for the second prize. The committee recommended that the essay designated by "Ad bellum pace parati" be awarded the first prize and that designated by "Isis" the second prize. The report being approved, the president opened the envelopes with the indicated designations, revealing in the first, the name of Capt. Mahlon Ashford, M. C., U. S. Army, and in the second envelope the name of Asst. Surg. Gen. Wm. Colby Rucker, U. S. P. H. S. He thereupon awarded the prizes as indicated.

The council then resolved that now and hereafter, the essay receiving first honorable mention for each of the Wellcome prizes, shall be awarded a life

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membership in the Association. The committee having reported the essays designated "Omnia pro patriae caritate" and "Sanitario" as second in standing for the respective prizes, the envelopes so addressed were opened and found to contain the names of First Lieut. Henry C. Coe, M. R. C., U. S. Army, and Passed Asst. Surg. J. Raymond Hurley, U. S. P. H. S., whereupon they were duly declared life members of the Association.

The report of the treasurer *ad interim* was submitted, showing a most satisfactory condition. It was received and referred to an auditing committee, whereupon the council adjourned to meet at the call of the president.

CONSOLIDATED WEEKLY REPORTS OF SICK AND INJURED, SOUTHERN DEPARTMENT, U.S. ARMY.

1916 for week ending	Troops	Mean strength No.	Per cent of sickness	Per cent of sickness last report	Dead		Transferred No.	Actual No. of cases						
					Disease No.	Injury No.		Diarrhea	Dysentery	Malaria	Variola	Typhoid	Paratyphoid	All other diseases
December 23...	Regular	46,933	3.13	2.51	6	2	187	2	16	8	..	5	2	2,030
	Militia	95,970	3.02	2.69	16	1	571	9	21	84	1	12	17	4,983
December 30...	Regular	47,758	3.18	3.13	4	2	198	7	21	10	..	3	2	2,169
	Militia	95,970	2.66	3.02	10	1	644	14	21	73	..	11	15	4,613
1917	Regular	47,758	3.28	3.18	6	4	205	3	19	7	..	2	1	2,162
January 6.....	Militia	82,174	3.24	2.66	9	2	662	8	17	53	..	10	13	4,580
January 13.....	Regular	47,758	3.35	3.28	7	5	282	4	22	7	..	2	1	2,229
	Militia	82,174	2.95	3.24	13	3	749	12	16	44	..	7	9	4,330
January 20.....	Regular	47,758	3.53	3.35	4	2	340	3	14	10	..	3	...	2,431
	Militia	82,174	3.47	2.95	12	3	662	5	14	36	..	2	7	4,269

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CURRENT LITERATURE

Surgical Experience in the Battle of Jutland.[1] By Alexander Maclean, Flee Surgeon and Horace E. R. Stephens, Surgeon, H. M. S. *Lion*.

For the sake of simplicity, the report treats the subject under the following hearings:

The Medical Organization: Accommodation of Wounded; First Aid; Ventilation.

Treatment of the Wounded during Action.

Treatment of the Wounded after Action.

There were two distributing stations on board H. M. S. *Lion*. During the action the mess-deck received all stretcher cases and, in this manner, parts of this deck became dressing stations automatically. Those injured in turrets and in isolated compartments were removed only during a lull or after the action.

Ships' ventilation appears to have received added importance during action. All fans were run right up to the commencement of the action and restarted during lulls. Considerable trouble was experienced on the mess-deck on account of smoke from burning debris, mixed with T. N. T. (trinitrotoluol) fumes, but no cases of "gassing" occurred. The simple respirator of gauze and waste proved very efficient in combating these, and so enabled the fire-parties to "carry-on."

Nearly all casualties occurred within the first half hour. A few of the cases found their way to the forward station, but the great majority remained on the mess-deck. The scenes that greeted the medical officers making an inspection during the first lull are said "to beggar description."

Electric lamps and pocket lamps were invaluable. Morphia in 2/3-grain doses was given hypodermically to all and this, in many cases, was repeated during the night. These maximal doses of morphia are said to have acted like a charm, pain being relieved instantly and hemorrhage controlled at once. Hence, the writers consider that, in dealing with a large number of wounded on board ship, the best practice is to place them under the full influence of morphia as rapidly as possible. During the evening ten of the most desperately wounded succumbed; it was impossible to move any of them during the night, in view of the probability of the action being renewed at dawn.

At 7.30 a. m., on June 1, the surgeons were informed that it would be safe to bring the wounded up from below. The vice-admiral's and captain's cabins were cleaned, dried and thoroughly ventilated, which took considerable time, as both cabins were full of water and smoke. The captain's bathroom was rigged as an operating theater and at 8.45 a. m. work was begun. Difficulty was at first experienced by lack of water. In all, fifty-one cases were dealt with; a general anesthetic, chloroform and ether in equal parts, was administered to twenty-eight. Only urgent operations could be attempted, all the patients

[1] *Journal Royal Naval Medical Service*, Oxford, Vol. ii, No. 4, October, 1916, p. 421.

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having waited a long time and 44 per cent of casualties among the medical personnel having occurred. "Esnol" was the only antiseptic applied to wounds.

General burns, invariably due to cordite fires, were very severe and fatal. It is mentioned as a striking fact that almost 50 per cent of the wounded suffered from burns of the face and hands alone. These were caused by the flashes from high explosives in a confined space which were so momentary that clothing protected the rest of the body; the eyes, being closed in time, escaped injury! Picric acid dressing proved satisfactory as a first-aid application.

The surgeons worked continuously from 8.45 a. m., June 1, to 12.15 a. m., June 2. Needless for the operating staff to admit that they were pretty well exhausted when the work was done.

There is no naval surgeon in the world, able to read between the lines of this brief but graphic report, who is not moved to sympathy as well as admiration over work done under such difficult and trying conditions.

H. G. Beyer.

CORRESPONDENCE

U. S. Public Health Service,
St. Louis, Mo., January 11, 1917.

To the Editor, The Military Surgeon.

The following note on the use of Normal Horse Serum in the Treatment of Typhoid Fever may be of value to the readers of the journal.

In October, 1914, 10 c.c. of normal horse serum were administered to a typhoid patient in this hospital for the purpose of controlling intestinal hemorrhage. Clinical observations made at that time rather suggested that the normal horse serum might possess curative, in addition to its hemostatic, properties.

In December, 1914, another typhoid patient was given 10 c.c. of normal horse serum, as a prophylaxis against impending hemorrhage. The effect on the temperature and general condition in this case still further suggested the curative properties of the serum.

In April, 1916, a young adult was admitted to hospital with the following history: The onset was April 7, and began with a chill and with such weakness that he was unable to continue work. There were no preliminary symptoms of malaise. An examination of the blood revealed no evidence of malaria. On April 13, a provisional clinical diagnosis of typhoid fever was made, and at noon blood cultures were taken from the vein. On April 16, a positive Widal was present, and the cultures indicated the presence of B. typhosus. At 4 p. m., April 16, 10 c.c. of normal horse serum were administered hypodermically. Twenty-four hours later there was a pronounced chill and fall in temperature, but the patient's mental condition cleared up noticeably. The temperature again rose, but became normal on April 22, and continued so. In this case

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the serum was administered on the tenth day of the disease, and the temperature became normal on the sixteenth day of the disease. A second positive Widal was obtained on April 25. The provisional clinical diagnosis in this case was confirmed by both Widal and blood cultures, and the inference is that normal horse serum has curative properties for typhoid infection. The chill which occurred twenty-fours hours after the administration of the serum was pronounced, but lasted only a short while after the administration of a quarter of a grain of morphine and the application of hot-water bottles. For two days prior to the administration of the serum, the patient had been given lemonade at 10 a. m. and at 3 p. m. There was no evidence of a disposition to anaphylactic shock, as the patient's pulse continued good, and his general strength appeared not to be unfavorably affected.

In October, 1916, two more cases of typhoid were given 10 c.c. each of normal horse serum. The infections were so severe as to make the prognoses unfavorable. After the administration of the serum both cases improved steadily and recovered promptly.

It is my impression that the course of typhoid fever can be controlled very advantageously by the administration of normal horse serum, and that possibly it would be better to administer two doses, forty-eight hours apart. Should untoward symptoms appear, the administration of adrenalin doubtless would avert any danger.

These five cases are reported in the hope that those who have the opportunity of treating typhoid patients, may see fit to make pertinent observations.

Very truly yours,

MARK J. WHITE,
Surgeon U. S. P. H. S.

At the monthly meeting of the N. Y. Division, Medical Reserve Corps, January 13, 1917, Lieut. Leon Le Wald and H. H. M. Lyle demonstrated the method of roentgenology and wound-treatment employed in Carrel's hospital, in which Dr. Lyle was on duty for several months. The lantern pictures were numerous and of unusual excellence. The audience was large and enthusiastic. Med. Inspector George Lung, U. S. Navy, and Lieut. Col. Henry Page, M. C., U. S. A., took part in the discussion.

The Annual Banquet of the Association will be held on the evening of February 10, at the Hotel Savoy. Several medical officers of the Army and Navy will be guests on that occasion.

First Lieut. Robert D. Maddox, M. R. C., U. S. Army, was recently elected president of the newly organized Cincinnati section of the Association of the Medical Reserve Corps, U. S. Army. The formation of the corps is a part of the preparedness policy. First Lieut. Goodrich R. Rhodes is vice-president; First Lieut. Elmer Klein, secretary and treasurer, and First Lieuts. Louis J. Ransohoff and H. L. Freudenberger are directors.

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Llano Grande, Texas, January 12, 1917.

The Editor,
THE MILITARY SURGEON,
Washington, D. C.

DEAR SIR:

I notice that you publish in your January number a report of the means we use to keep people interested in Ambulance Company No. 1, Indiana. Since that report was written the Guard has been called into active service and, I believe, the effect of such interest has been proven.

June 19 the company numbered four officers and forty-five enlisted men. We were ordered not only to recruit the company to its maximum, but to supply a regimental detachment as well, promoting some of the best privates first class to fill the noncommissioned offices.

Upon arrival at Fort Harrison we had sixty-five men for the company and sixteen for the detachment. About July 1 another Ambulance Company was organized. In this organization our senior lieutenant became the company commander and nine of our noncoms and privates first class were transferred to fill the noncommissioned grades. On August 20 the company commander was ordered back to Indiana to organize another Field Hospital. This placed the man, who was the junior lieutenant June 19, in command. As a nucleus for this new organization the first men enlisted were those who had served at least one enlistment with the old company. As a result, all of the noncommissioned officers, cooks and special duty men had had previous service.

Just a word that may be helpful to anyone who may later have to recruit a new company, or men for an old one. Motion pictures of the border and lantern slides of conditions down here, secured the recruits. Before leaving southern Texas I took about 400 feet of film and fifty pictures. These were used in every place we tried to get recruits. How much good they did may be judged from the fact that, with them, one officer secured four officers and thirty-five men; while a recruiting detail of seven officers and twenty-one enlisted men secured only sixty-three (for all arms of the service) in the same time.

I enclose some pictures of a series I have been working on for some time. I hope before long to have pictures this size showing each movement in the drill for Sanitary Troops. It seems to me these, in lantern slides, should be an aid in armory instruction. The idea is not original, for the same is used by the British Army, but, to my knowledge, none are in use here.

Very respectfully,

A. G. CHITTICK,
Major, M. C., Comdg. F. H. 2, Ind.

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THE MILITARY SURGEON

PUBLISHED BY THE
ASSOCIATION OF MILITARY SURGEONS
OF THE UNITED STATES
ARMY MEDICAL MUSEUM, WASHINGTON, D. C.

MARCH, 1917

VOL. XL NUMBER 3

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The Military Surgeon

Published monthly and constituting two volumes annually.
Volumes commence with the January and July numbers.

Entered as second-class matter January 22, 1916, in the Postoffice at Washington, D. C., under the Act of March 3, 1879.

Subscriptions $3.50 a year for the United States. Elsewhere throughout the world, $4.00. Single copies 40 cents. Subscriptions payable in advance. Checks should be made payable to the Association of Military Surgeons and not to any officer personally.

The addresses of members and subscribers are not changed except upon request. In every case the old as well as the new address should be given. Requests for change of address must reach the Secretary before the twentieth of the month to be effective for the following issue.

Original articles, items of news and matter of interest to the Services are welcomed. Requests for reprints should be made at the time of forwarding articles.

EDITED BY

Lieut. Col. EDWARD L. MUNSON
Medical Corps, U. S. Army

COLLABORATORS

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Medical Director EDWARD R. STITT, U. S. N.
Commandant, Naval Medical School

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U. S. P. H. S.
Director, Hygienic Laboratory

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Professor of Hygiene, United States Military Academy

Surgeon R. G. HEINER, U. S. N.
Instructor in Hygiene, United States Naval Academy

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Director, Field Service School for Medical Officers

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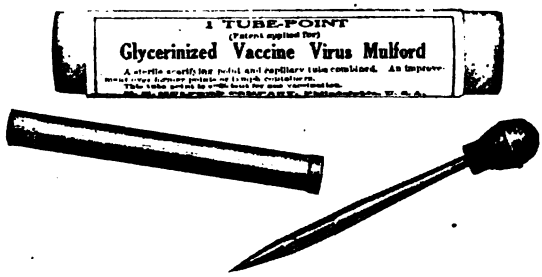

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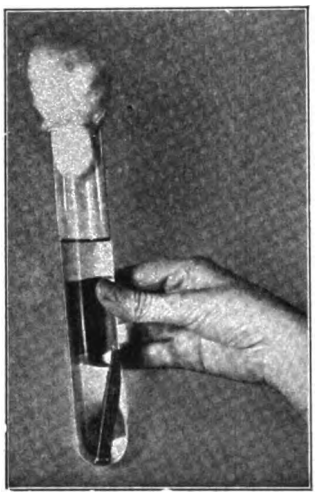

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VOL. XL MARCH, 1917 NUMBER 3

ORIGINAL ARTICLES

Authors alone are responsible for the opinions expressed in their contributions

THE INFLUENCE OF THE EUROPEAN WAR ON THE TRANSMISSION OF THE INFECTIONS OF DISEASE, WITH SPECIAL REFERENCE TO ITS EFFECT UPON DISEASE CONDITIONS IN THE UNITED STATES

THE ESSAY FOR WHICH THE SECOND WELLCOME PRIZE, 1916, WAS AWARDED TO

ASST. SURG. GENL. WM. COLBY RUCKER
United States Public Health Service

IT is not the direct results of the actions of individuals and nations which produce the most far-reaching and lasting effects upon the human race. The vast and intimately correlated series of events which succeed upon the indirect results of action extend by such circuitous paths to every stratum of human society that it is as though a pebble carelessly dropped into the ocean had produced a tidal wave on some far-distant shore. The world at the present time is the witness of an upheaval of such magnitude that it is impossible for the mind of man to grasp it in its entirety, much less to foresee what its results shall be in the future. Cosmic forces have been brought into play in this gigantic warfare. The nations of the world are employing their every resource to an end which no one can foresee or imagine. The direct results of this war of wars will become a matter of history, but the indirect effects will be so varied and will mould the lives of men and nations in such a multiform number of ways as to be beyond human comprehension.

On June 28, 1914, a small pellet of lead forcibly ejected from a cheap revolver in the hand of a Servian student struck the spark kindling the waiting tinder from which the whole world was to be set on fire. The calm of the eight days succeeding was but the lull which precedes the raging tempest. The heir of the empire of the Hapsburgs, the hope of Austria, had been slain, but it was not until July 23 that the Austrian ultimatum was dispatched. The abject reply of Servia followed in two days, and with it the storm broke. Russia intervened for the "little Slav brother" on the twenty-sixth; Austria-Hungary declared war on the twenty-eighth; Russia mobilized on the twenty-ninth;

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Germany declared war on Russia on August 1, and invaded Russian territory on the second; the invasion of Belgium began on the third; France, England, Japan, Italy, Turkey, Portugal, Bulgaria and Roumania were drawn into the conflict which was to shake the earth to its foundations.

The nations drew their forces from the scattered portions of the globe. Algeria, the Sudan, South Africa, Canada, Newfoundland, New Zealand, Australia, the Straits Settlements, Ceylon, Nigeria, the West Indies, each contributed their thousands, and from India came the Indian—Rajput, Durkha, Sikh, and Pathan. Soon the theater of war was a modern Tower of Babel, each of the nations bringing its own language, customs, and diseases, each in turn to be influenced by the language, customs and the diseases of the other. The Siberians suddenly found themselves in Poland; the Russians were quickly transported to Turkey and Persia. French, Irish and Scotch occupied the Gallipoli peninsula, while on the firing line in Flanders, Arabs, Algerians and Sudanese stood shoulder to shoulder. Whole armies suddenly exchanged the northern environment of England for German Africa, Mesopotamia and the Dardanelles. A battalion of Fijis appeared in northern France. The Australians occupied the German islands of the South Pacific and the Teutons poured over into Poland and Serbia. Cairo, Suez and Greece became the temporary abiding place of the New Zealanders.

All of these millions of men, suddenly withdrawn from the accustomed environments of peace, were subjected to new modes of life, to a change in food, habitation, clothing and habit. They were thrown into intimate contact with other men who bore in their bodies the infectious agents of foreign diseases. They burrowed into soil saturated for generations with the manure of animals and man. They fought one another with all the ingenuity of modern science, with every physical agent of destruction which the human mind can imagine or conceive. The air, the earth and the waters under the earth were to them but routes by which the annihilation of an enemy could be accomplished. Like giant wrestlers they rocked to and fro across the fair land, devastating and laying waste the work of ages, evicting and reducing to starvation the civilian population. Forests of barbed wire replaced vineyards, and hillsides, which had never been excavated save for wine cellars, became vast labyrinths of trenches and underground dwellings. Clerks left their desks for open fields, the newsboys of Paris slept beneath the stars, the rich and the poor, the cultured and the unlettered, the Christian and the Turk found themselves transported into alien surroundings.

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Soon the hospitals began to show the results of this new environment and exposure to new infections. Typhoid appeared among the uninoculated French troops, and it is said that at one time they had no less than 30,000 cases. But this was controlled and the disease is now a rarity since inoculation has become obligatory. Cholera broke out among the German troops in Galicia and the Rakitno marshes, but less than one-half of 1 per cent of the troops had the disease and of these only 10.2 per cent died. This was because of the efficacy of the anti-cholera prophylactic. Among the uninoculated civilian population the mortality rate was 50 per cent. In both the military and the civil population the disease was controlled and finally eradicated. Tetanus occurred with frightful regularity among the wounded at the beginning of the war, but the routine use of anti-tetanic serum has largely succeeded in preventing this dreadful complication. The lack of bathing facilities in the trenches and other means of ridding the troops of lice permitted typhus to make large inroads in the early part of the war, and famine conditions in Serbia permitted the disease there to reap a frightful harvest. The war is now on a more or less permanent basis and the installation of the machinery of cleanliness has practically eradicated this disease, except in Turkey, where it is now prevalent. Gangrene and gas-bacillus infection, hitherto considered as almost negligible factors in modern warfare, have been from the first a serious problem, one which is not even yet solved. Malaria has invalided many men, while measles and, to us, the commoner exanthemata, have laid heavy toll upon contingents to whom they were new. Pneumonia and the respiratory affections attacked those dwellers of the tropics who were unused to cool climates, while in some instances the unaccustomed diet and poor character of the food led to gastro-enteritis and other similar intestinal affections. Not all of the pneumonia by any means occurred in the troops from the tropics. Sir William Osler, in discussing this question, said: "The allied armies in the west have been singularly free from camp diseases—no cholera, typhus, or malaria, and extraordinarily little enteric. Never before in history has so great a host been assembled; never before in war have armies been so healthy. The common civilian diseases have had their innings and have played relatively the most important rôle—colds, and coughs, rheumatism in many forms, and mild fevers. When the mortality statistics of diseases are published from the army of the west the best 'killer' will be found to have been the pneumococcus, the home-bred germ which the soldier takes with him or easily procures from a comrade. A short, sharp, honest disease, pneumonia either kills at short range or recovery is rapid or without sequelae."

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While it has been possible to control, through the intermediation of sanitation, these common diseases with which we are familiar at home, new diseases and new conditions have appeared—trench fever, trench foot, war nephritis, epidemic jaundice, influenza polonica—ailments so new and bizarre that their nature is as yet not entirely determined, many of them so new that they have not even been given a name. These are the diseases for which we have not yet been able to evolve a complete set of prophylactic measures.

The ratio of wounds has from the first been very high and the number of permanent injuries correspondingly large. The continuous strain of trench warfare has produced much neurasthenia and mental aberration, while the shock of heavy gun-fire, when it has not produced death outright, has frequently brought about nervous conditions or actual insanity. It has been known for some time that about one-fifth of all soldiers discharged are discharged on account of mental disability. Striking as is the prevalence of mental disease among soldiers and sailors in time of peace, it should be borne in mind that this is greatly increased during war. Injuries of the central nervous system due to the wind of explosives, hysterical aboulias developing in the heat of battle, hypomaniacal outbursts in protracted fights, nerve injuries by missiles, malingering of mental symptoms to escape active service, hypochondriasis and neurasthenia in young soldiers—all of these and many more have resulted from the present conflict. The intense emotional strain associated with warfare causes acute exacerbations of some of the milder psychotic and borderland cases, which were able to get along unnoticed under the less stringent requirements of civil life. It has been found that cases of arrested dementia precox, neuroses and psycho-neuroses, cyclothymia, and high-grade imbecility have all been found among soldiers who have been mustered in without any suspicion that such conditions existed. As White says, "A man may be quite able to get along all right—in fact, to perform his duties with marked efficiency in time of peace—who would break completely under the stress of war. This has long been realized as true of the physical, but we must begin now to realize it as equally true of the mental, especially as the game of war comes more and more to be played with brains." When the war is over it will be mental disease rather than physical disease which will have been spread in Europe, out of which there is danger of their exportation to the United States. While it is true that it is a departure from the thesis, the writer wishes to point out this fact and to emphasize the necessity for constant vigilance on the part of the health authorities of the United States, lest there be an influx of mental defectives at the close of the war. That mental deterioration has already

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been produced by the war and that there is danger of these mental defectives emigrating to the United States is witnessed by the fact that, in connection with the medical examination of arriving alien immigrants, there has been a marked increase in the number of certifications for mental disease since the beginning of the war. Naturally, our sympathies are touched and it will be with regret that we turn from our doors the lame, the halt, the blind, the insane, and all the flotsam and jetsam of the European war, but the national health demands that this duty be performed with thoroughness.

While there are many of these unfortunates who can be, and are being, returned to comparative usefulness, there remain many who, in spite of all that can be done, will be hopelessly incurable in body or in mind. The war may cease and peace may come, but a certain proportion of the blind, the deaf, the demented, the crippled and the deformed will remain to lead a useless, unproductive parasitic existence upon the body politic.

Many will acquire chronic infections in their new environment. Returning to their homes they will constitute foci for the distribution of the infections to their neighbors, and the health officer of the future will be in constant combat with infections with which at the present he may be wholly unfamiliar. But the important point is that health officers, both in Europe and the United States, will be on the lookout for these infections, research workers will carry on investigations as to their nature, cause and means of spread, and quarantine officials will be active in preventing their importation. At the close of our own Civil War, typhoid fever, which had previously been an urban disease, was carried by the returning troops to the remote rural portions of the United States, with the result that at the present time the country is the home of the disease. That the present war will bring similar results is entirely probable. Conversely, places now occupied by foreign troops are themselves liable to infection with the organisms which those troops have carried in their bodies from their distant homes. In many instances, these organisms will not thrive because of lack of favorable climatic environment or obligatory intermediate host, but unfortunately this world movement of armed men is bound to result in at least a partial change in the geographic distribution of some of the infections of disease. In all probability, the necator Americanus will find a lodgement in Europe, and typhoid and cholera carriers will transport these infections into new localities. As an example of the extent to which disease parasites are found in soldiers may be cited the experience of G. Sangiorgi (Revista di Igiene—Sanita Publica, xxvii, 8, May, 1916, p. 193) who found that of 2,620 soldiers examined in

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the military hospitals in the territory of Venice, 20.4 per cent harbored the *Ascaris lumbricoides*, 21.3 per cent the *Tricocephalus trichiurus*, 0.26 per cent the *Anguillula intestinalis*, 0.15 per cent the *Tenia saginata*, and 0.07 per cent the *Anchylostoma duodenalis*.

But the longer war lasts the greater will be the opportunity to apprehend and destroy these infections, the greater will be the advantage which sanitation will gain over them and, therefore, their spread will be lessened in the war zone and the chances of their exportation to the United States will be correspondingly diminished. Today the fighting men in Europe are healthier than they were six months ago. Six months hence the incidence of disease will be still further diminished. The rude ploughed fields of northern France have undergone a marvelous transformation at the touch of sanitary science, and today those areas which a year ago were the witness of outbreaks of paratyphoid and typhus are in far better health conditions than many of the rural districts of the United States.

Our attention has been so focused on the surgical aspects of the war that very little attention has been paid to the splendid way in which this has been accomplished. It is all the more remarkable because it has been done by men who only a short time ago were civilians. The usual plan of organizing the sanitary service has been to form sanitary units of twenty-five noncommissioned officers and men under the command of a single officer. This officer was usually a medical officer of health in civil life or the holder of a degree in public health. In certain instances, a bacteriologist or a sanitary engineer was chosen for this place. The noncommissioned officers were usually sanitary inspectors or chemists, while the other enlisted personnel were plumbers, carpenters, bricklayers, and others in the building trades. The duties of the sanitary service are varied and include the installation and operation of every structure or appliance that appertains to sanitation in the field; the guarding of water supplies and the careful treatment of those of doubtful origin; the testing of rations; the operation of bathhouses and laundries; the issue of parasite-free clothing and blankets; the cleansing and disinfection of houses; the destruction of garbage and manure or other possible breeding places for flies; the cleanliness of camps; the isolation of patients suffering from infectious disorders, also the contacts thereto both in the military and the civilian population; the administration of typhoid and paratyphoid prophylactic; the search for "carriers;" the immediate investigation with the help of the mobile and base pathological laboratories of all outbreaks, whether among the troops in the fighting zone or those on the lines of communication or elsewhere; and the maintenance of spot maps, charts, and tables

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revealing the health history of every unit in the field. Gigantic lorries rapidly transport from place to place enormous disinfectors, each having a capacity of 60 cubic feet, thus permitting the rapid sterilization of the clothing of troops. Details of sanitary troops are engaged in draining mosquito-breeding swamps, while others lay out and build water-filtration beds and sewage-disposal plants. The immediate effect is the betterment in the health of the troops, many of whom are now in far better physical condition than when the war began. The indirect effect will be a great diffusion in the knowledge of hygiene and sanitation, and as the product of this gigantic demonstration there will be an improvement in the public health of Europe upon the close of the war.

Another far-reaching benefit has accrued from this terrific combat, *i.e.*, the decrease in the use of alchoholic beverages. Russia, once synonymous with the over-consumption of ardent spirits, has "gone dry," England has cut her drink bill enormously, while economic conditions have greatly lessened the use of intoxicants by the Central Powers. That the habits of temperance thus acquired will persist is entirely probable, and that health conditions will be improved thereby is quite certain.

The decline in the birth rate has combined with the appalling wastage of the able-bodied male population to make the maintenance of the population in the future a serious matter. This has brought forcibly to the minds of the warring governments the serious necessity of preserving the lives of the infant population. The prevention of infant mortality has been made doubly difficult by the high price of all food commodities, and, in Austria and Germany, by the actual scarcity of foods of all sorts. In Germany there are about 18,000 illegitimate births each year. Since the death rate is higher in this class, these have been legitimatized and throughout the empire motherhood societies are teaching the care of children. In Germany the Crown pays a bounty to all mothers nursing their children over six weeks. Motherhood pensions are also used to promote the careful rearing of children. In England preventive obstetrics and the prematernity movement are aiming in the same direction—in fact all Europe is concentrating on child welfare as never before. Here again is seen a good effect in the prevention and control of disease which has come out of this unhappy war.

The problem of the wounded has also received careful attention. Hospital facilities of every description have been provided by each of the nations now at war. Great hospital ships—converted liners once floating palaces—transport the wounded. Old manors are now hospitals, and in a great school building in Paris the finest surgeons of America

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have given of themselves to the restoration of the maimed. Every endeavor is being made to return each wounded soldier to usefulness, and the results which have been accomplished border on the miraculous. Yet in spite of all of this, in spite of all the wonderful achievements of prosthetic surgery, many will never see again and many will be cripples throughout life. Some can never be more than animated vegetables and these will always be a drain upon the body politic, but the campaign of re-education now going on in England, France and Germany aims to make useful, self-supporting citizens of all of those who have a remaining faculty. First of all, the disabled soldier must be aroused from the condition of moral inertia which is so frequently the outcome of his disablement. This object can be well accomplished only by teaching him how to use to the best advantage the physical qualities and mental abilities which have been left to him. The ultimate consequences will be appalling if these cripples are permitted to lapse into a state of mental lethargy. As Baurillon has pointed out, work is the sole route by which these unfortunates may be made useful to the state and economically independent. The idle man is dangerous alike to the health and the welfare of the nation, and the policy of re-education aims to turn the unemployed crippled soldier into a source of prosperity and health. The blind are being trained in music, in weaving, broom-making and basket-making. The deaf are becoming typists and tea-tasters, while others are being taught wood and metal working, saddlery and many other useful arts. In the schools which Belgium has established in northern France, men who could not read or write five months ago have learned in that time as much as a child learns in five years. Telegraphy, typewriting, stenography, and the electrical trades are being taught to soldiers who, a short time ago, had little or no education. And with all this industrial training the necessity for personal hygiene and civic sanitation is being inculcated. All of this bears an intimate relation to the post-bellum spread of disease both in Europe and from it to the United States. Remarkable as it may seem, the war, with a few exceptions, has not had an untoward effect upon the public health of Europe. It is true that there have been outbreaks of typhus, cholera, dysentery, and typhoid among the civil population, but in each instance the military authorities have recognized the fact that the health of their commands was, to a certain extent, dependent upon the health of the civil community, and they have, therefore, rapidly put in force measures looking to the suppression of these diseases. Reports from all of the European nations are not available, but on Tuesday, July 11, 1916, Mr. Long, the President of the Local Government Board (the organization in control of civil health matters in England), speaking in the House

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of Commons, in reviewing the work of his department, stated that the general conditions of England had never been more satisfactory. He stated that pauperism had nearly vanished, that unemployment does not exist, and there has been a steady decrease in typhoid fever and a high standard of health exists in spite of the fact that enormous numbers of men have suddenly been collected in areas where, at first, sanitary accommodations were of a makeshift nature. He said that cerebro-spinal fever at one time caused a great deal of anxiety, but now has practically vanished. In the early days of recruiting there was some smallpox, but this has been stamped out, and the thorough vaccination both of the troops and the civilian population has prevented its recurrence.

Heretofore the "war pestilences," typhus fever, bubonic plague, cholera, typhoid fever, dysentery and smallpox, have always followed at the heels of belligerent armies. The aggregation of large bodies of men has permitted the interchange of the infections which they bring into the war in their own bodies or which they meet in their new environment. Hardships and suffering—the lack of food and the inefficiency of its preparation, exposure, over-exertion, excitement, lack of regular habits, the absence of the means of cleanliness—lessen the individual powers of resistance. The pollution of the soil, the breeding of insects, the close association which occurs among the members of fighting armies, sow the infections of disease broadcast, and upon the return of the troops to civil pursuits there occurs a widespread dissemination of the causal agents of disease. The histories of the Peloponnesian War, the wars of the middle ages, the Crusades, the War of the Roses, the Thirty Years War, the Napoleonic Campaigns, the Russo-Turkish War of 1828-9, the Crimean War, the Civil War, the German War of 1866, the Franco-Prussian War, the Russo-Turkish War of 1877-8, the Boer War, the Russo-Japanese War and the Balkan War show how severely belligerent armies are attacked by infectious diseases and the disastrous results which have thus been brought both to combatants and noncombatants, both during and after the war. The belief that war was the inevitable precursor of pestilence, the theory of the spontaneous origination of epidemics, the enlistment of diseased persons, the entire absence of prophylactic methods, the omission of even the most primitive measures for the control of disease, and the very manner in which war itself was conducted heretofore, converted whole armies into vast incubators and wholesale spreaders of disease. Today war is not a sudden sharp conflict in which the outcome is decided by a single battle or a short series of engagements, neither is it a succession of guerilla campaigns conducted by "free companies" of ill-controlled

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mercenaries. It is, on the contrary, as we have seen in the case of the present European war, a long-drawn-out struggle, for which the most careful preparation is necessary and in which no single item which will contribute to success can be overlooked. The careful medical examination of recruits, their thorough training to bring them to a high state of physical efficiency, the administration of smallpox, typhoid, paratyphoid and cholera prophylactics, the minute attention which is given to the food, housing, clothing and sanitary surroundings of soldiers, the prompt measures which are taken to suppress outbreaks of communicable disease, the attention to cleanliness and the prevention of overfatigue, all make for healthier armies and against the occurrence of epidemics in them. The advancement of the science of epidemiology has been rapid and sure. The causal organisms of most of the pestilential diseases have been discovered, the mode of transmission has, in most cases, been accurately determined, the intermediaries in their spread are now known and the methods for their prevention and suppression accurately worked out. Investigators in many parts of the world have studied the conditions under which infective agents live, the way in which they enter and leave the human body, and have discovered the dangers which accrue from chronic germ-bearers. Both the civil and the military authorities have interested themselves in the prevention of disease, each profiting by the knowledge which the other has gained. Both have learned that the greatest single agent in preventing and controlling disease is education, particularly the education of the civilian population. This and the fact that most of the countries in Europe possess an excellent body of local health officers has contributed as much as any one item to the control of disease in the present war.

It seems as though the war must continue for at least two years more. This will give additional time for the perfecting of the sanitary machinery of the belligerent nations. This will be necessary to prepare the home countries for the reception of the troops. Most of the returning soldiers will be in relatively good health, but those who have been long in prisons, particularly those who have been prisoners of the defeated nations, are more apt to be diseased. For the most part, those infections known as the "war pestilences" need be little feared. Our knowledge of these is so accurate as to make their control relatively simple. Tuberculosis will, perhaps, be the greatest scourge, since it is not always possible to exclude the tuberculous at enlistment, and the exposure and fatigue of war is apt to light up latent foci and to aggravate conditions already existing.

The amount of disease spread which will occur in Europe after the

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war is dependent upon two factors: first, upon the degree of the community's sanitary intelligence, and, secondly, upon the economic conditions which will prevail. Most of the nations of Europe are well abreast of the times in public hygiene. A few are backward and these are the ones which will suffer most. On the western front, none of the so-called war-diseases exists in epidemic form at present. Typhus and typhoid appeared early in the campaign but were quickly stamped out. The Austrian cholera outbreaks were speedily eradicated, but Turkey is now in the midst of a typhus epidemic, and, in view of its lack of generalized hygienic education and the fatalistic character of its people, it may be considered as highly probable that outbreaks of other diseases will occur there both during and after the war.

Economic conditions will affect the health situation in another way. We have already seen that, on the whole, the war has had a beneficial effect upon the health of England. It is to be noted that coincident with the rise in health there was a fall in pauperism and unemployment. Immediately on the close of the war there will be a struggle of another sort between the nations of Europe—a struggle for the markets of the world. German commercial agents are even now busy in South and Central America trying to keep alive the business entente cordial; the merchant marine of England is constantly expanding in the hope that the world's goods must be transported in British bottoms; the French are not overlooking America as a market, while Japan is trying to control the commerce of China. When the treaty of peace is signed there will be an immediate rush to rebuild the factories which have been destroyed or which have decayed from non-use. Powder mills will be turned into dye-works; gun-factories will make plows; artillery shops will make automobiles; the looms will begin to turn; wheat will grow where armies now camp; villages, cities and towns will spring back into life and there will be few idle people in Europe. Labor will be at a premium. Labor will prosper as never before, and rights which have been hitherto unheard of in Europe will be granted the industrial class. As a result, there will be little or no pauperism, no unemployment and a living wage will be paid. These things will make for health.

The war has taught the women of Europe that they are capable of performing almost any class of work which men now do. When peace comes they will continue in many occupations to which they were formerly foreign. The effect which this will have on their health need not be discussed here, but their labor will help to increase national prosperity and thereby to meet the debt of war. This will in turn react to reduce disease.

We in the United States are interested in the health of Europe both

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in peace and war times, because, if we have learned any one thing from the present conflict, it is the absolute interdependence between America and the foreign nations. We have learned that we must pay our share for the war. We have seen how near we ourselves have come to being drawn in the maelstrom, and realize that, unless we are very careful, disease in Europe may mean disease in the United States. So far as the "war infections" are concerned, we have little to fear. In the first place, the bulk of the belligerent nations will have relatively small amounts of these infections, and, in the second place, we have an adequate protection by our immigration and quarantine stations. Even if these did not suffice, there is a second line of defense in the state and local health officers. Sanitary education is advancing by leaps and bounds in the United States. The lay public is pretty well alive to the dangers of epidemic disease and would insist upon the prompt application of eradication measures, should, by any chance, any epidemic pass quarantine and gain a foothold. There is small likelihood of this occurring, but should it become necessary to attack any of these infections, we have the necessary knowledge and ample machinery for the purpose. It may be necessary to impose special restrictions against immigrants from Turkey, Greece, Servia, Roumania and Austria. These restrictions would largely consist of delousing to prevent the introduction of typhus fever and stool examinations to eliminate chronic cholera bacillus carriers.

It will be some time, however, before the tide of immigration turns toward America. In fact, the tide for a time will be in the opposite direction. Already thousands of foreign-born persons now resident in the United States have engaged passage to Europe on the close of the war. Two beliefs have influenced them in this—one is the anticipation of a tremendous demand for labor on the continent of Europe, and the other is the expectation that with the close of the war there will be a period of industrial depression in the United States. This belief is augmented by the present high cost of foodstuffs.

The fewer immigrants there are to be examined the more thorough can their examination be. This lessens the chances of diseased persons gaining admission and will permit the certification and deportation of a considerable number of undesirables. This is fortunate, because the class of immigrants which we will be receiving at that time will be simply the dregs of Europe. Economic conditions will be good in Europe for the able man, but the weaklings, the insane, the maimed, will have no place and will drift toward this haven of the oppressed, the fabled El Dorado so far as the peasantry of Europe is concerned. We must guard ourselves lest a weak-minded sentimentalism lead us into letting

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down the bars to a class of aliens whose condition is most pitiful but who have no place in our community and will be a menace to American health. The economic conditions which will be produced by the fierce commercial competition between the world's nations will give us sufficient employment in caring for the defectives which we have always with us, without adding further to the burden.

It is interesting to note one disease condition in the United States which is being profoundly influeneed by the European war. The improved economic conditions in the United States in 1916, as compared with previous years, resulted in a considerable diminution in pellagra. This disease is an extremely sensitive barometer of economic conditions, and it has been feared that there will be an increase in the number of cases early in 1917. The rise in the cost of forage has caused many wage-earners in the southern United States to sell their cows, thus depriving the family of milk, one of the best pellagra prophylactics. The present high cost of living, particularly the high cost of all foodstuffs, meats, eggs, and the legumes in particular, will reduce the ration of the average family. This will react to increase the amount of pellagra. If there is a rise in rents as well as food prices, these will combine to increase the prevalence of tuberculosis. To sum up the situation, the increase in disease in the United States as the result of the European war will take place in the economic disease group.

While it is a slight digression from the subject under discussion, the writer feels that there are a few lessons which may be drawn from the sanitary history of the European war which the United States would do well to heed. First of all, it is to be noted that those nations having the best civil health institutions maintained their troops in the healthiest condition. Secondly, that when disease broke out it was the military authorities of the nation having the most widespread health education who most quickly eradicated it. Thirdly, that the finest military sanitation which has been accomplished in this war has been performed by men who were trained in civil sanitation before they became soldiers, and the methods which they followed were simply the utilization of the principles of community hygiene.

In this country military hygiene has been brought to a high degree of efficiency and the health of our troops is conserved as never before. This improvement has been brought about by the expansion of the science of sanitation and the increase in the powers of medical officers. The officers, both of the regular establishment and the National Guard, are now trained in military sanitation. If, however, we should suddenly be plunged into a nation-wide war, and large levies of raw recruits be raised, this machinery could not possibly sanitate it all. In such

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an event reliance must be had on the civil practitioner of sanitation and the layman who is educated in a few of the basic principles of the prevention of disease—sanitary first aid, as it were. The general public in America is rapidly being educated in health matters, and this, in addition to the lessons in military hygiene given at the training camps, will stand us in good stead in any future campaign. The military observers now in the war zone will be able to give us much minute data on the methods now in use. We must adapt them to our American needs.

The results in Europe are a wonderful triumph for sanitation. It has changed the whole face of war, just as it has changed the entire aspect of life in civil communities, and those pestilences once considered as the inevitable accompaniment of military movement have been shorn of terror by the hand of science.

EPIDEMIC USUALLY FOLLOWED WAR

The present is the first great war in history which has not been followed by its attendant disease. During the previous invasion of France 74,205 men in the German field contracted typhoid and gastric fevers, and 8,904 succumbed to them. Moreover, after the seven months of the war of 1870 were over the returning soldiers brought with them an epidemic of smallpox from which upward of 170,000 died throughout the German empire.—*London Globe.*

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A COMBINED METHOD FOR THE LOCALIZATION AND EXTRACTION OF PROJECTILES

By JOSEPH MARSHALL FLINT, M. D.

Professor of Surgery, Yale University. From Hôpital 32 bis, Château de Passy, Fondation Fitzgerald

(With nineteen illustrations)

ALTHOUGH the localization and extraction of projectiles is primarily a problem of military surgery, there are few civil hospitals that do not have from time to time cases of gunshot wounds in which it is either desirable or necessary to do localizations and extractions. There are few surgeons, moreover, who have not had experience with the difficulties of attempting extractions without an accurate preliminary localization. What is, with adequate data, an extremely simple operation may become technically very complicated when the exact depth and relationships of the projectile remain a matter of doubt. There is, moreover, a very high percentage of failures in removing the foreign body in cases where the localization is inaccurate. Before the war, these methods were very complicated and, on the whole, quite unsatisfactory, because the localizing data obtained by the radiographer was presented to the surgeon in the form of plates or figures representing the depth of the foreign body from certain skin marks. This made the search a matter of no little difficulty, owing to the necessity of working in three dimensions with the topographical surface landmarks in two.

Since the war, there has sprung up a voluminous literature on this subject; literally dozens of localizing methods, many of which are accurate, most of which are complicated, some of which are insufficient, have been described. To be useful, a method should be both simple and exact. The surgeon preferably should do the localization, for the more information that can be obtained by the operator on the position and relationships of the foreign body, the easier becomes the operation.

Data for localization and extraction are usually obtained by the following steps: The presence and nature of the projectile or projectiles are determined by radiography or radioscopy. By general topographical localization, we obtain the approximate determination of the relations of the foreign body to the adjacent organs or tissues. This is done by moving the tube or moving the part containing the foreign body under the fluoroscope. The next stage is the accurate geometrical localization or the mathematical determination of the position of the projectile with reference to known points on the surface of the skin as well as to the adjacent organs and tissues.

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Finally, the extraction may be greatly facilitated by the employment, during the operation, of one of the surgical guides that have been devised:

(*a*) These may be visual as obtained by direct operation under the fluoroscope or with modifications of this method such as a Bouchacourt maundioscope.

(*b*) They may be auditory when one of the telephonic probes is used.

(*c*) They may be made tactile by the employment of the electro-vibreur of Bergonié.

(*d*) They may be material guides such as the Sutton localizer or the compasses of Massiot, Debierne of Grandgérard.

In our work at Hôpital 32 bis, Château de Passy, we used and experimented with some of the older methods. These we found inadequate and finally developed a system with which we were able to localize and remove any projectile for the extraction of which there were adequate and definite indications. While simple radiography alone is practically useless for purposes of localization, even when employed in two planes, it is, however, extremely valuable for the diagnosis of the presence of projectiles, particularly in cases where there are multiple shell fragments.

A great deal of useful information concerning the position and relationship of the foreign body may likewise be obtained by the preliminary use of the fluoroscope. Its general position, its mobility with reference to the muscle groups or respiratory action, and its reaction to digital pressure exerted on the skin surface are easily determined. The approximate depth can be obtained by moving the tube and noting excursion of the shadows of the projectile with reference to other opaque objects like the bones. Turning the part containing the foreign body under the fluoroscope likewise gives valuable data concerning its position and relationships.

The first step in the geometrical localization consists in the employment of the well-known ring compass to obtain upon the skin the points of entrance and exit of normal rays from the center of the target that pass through the projectile. These points represent the ends of imaginary diagonals which pass through the projectile. Such observations are made under the fluoroscope with the patient either in dorsal decubitus or in the erect posture, depending upon the situation of the foreign body. This method has been generally employed in providing two diagonals at right angles to each other for the use of the surgeon in doing extractions, but the method is quite inaccurate, owing to the fact that it is easy to miss the point of intersection of the diagonals representing the position of the projectile in the absence of any definite measurement of guides.

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The method of making these observations with the ring compass consists in roughly determining the position of the projectile, centering the diaphragm under the fluoroscope to obtain the normal rays and then applying the compass, one branch of which is on each side of the body, so that the projectile is accurately observed in the middle of superimposed shadows of the two rings (Fig. 1). As soon as this observation is obtained, the current is cut off, the light applied, and marks made upon the skin in the center of each ring. Inasmuch as

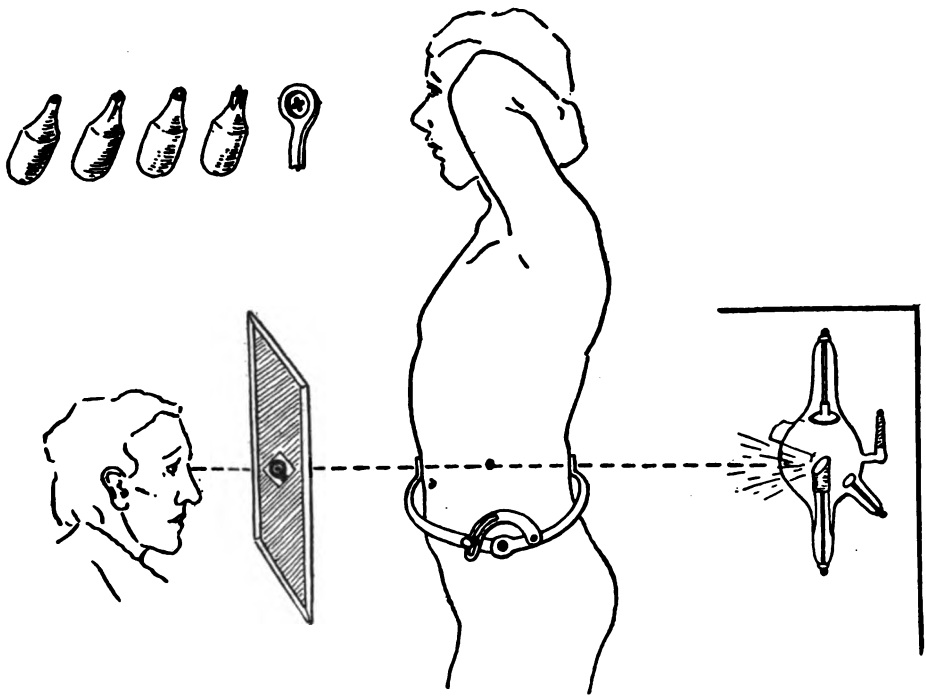

FIG. 1.

several observations have to be taken for purposes of accuracy, we have found it convenient to utilize a series of small wooden stamps with different signs; rings, squares, dots, etc. (Fig. 1), so that the ends of each diagonal can readily be differentiated in the later stages of the localization. These stamps, a suggestion of Dr. A. L. Prince, are whittled out of wood and are inked on an ordinary rubber stamp pad. As soon as the ends of the diagonal are marked, the patient is turned through an arc of 30° or 40° and a similar observation made. Ordinarily three or four of these are necessary, but in difficult cases we make as many as seven or eight. As soon as the skin marks have been

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obtained, the next stage in the localization consists in the utilization of a profondometer, which was devised by my assistant, Dr. John Irvin. While Irvin's ingenious instrument was original with him, I found on my return from France, when I had an opportunity to review the literature, that similar instruments had been employed by Warlutzel and Jolant, and Tuffier, although the method of application had been somewhat different. The Irvin profondometer (Fig. 2) consists of a hinged band of springless malleable metal like lead or block tin, which

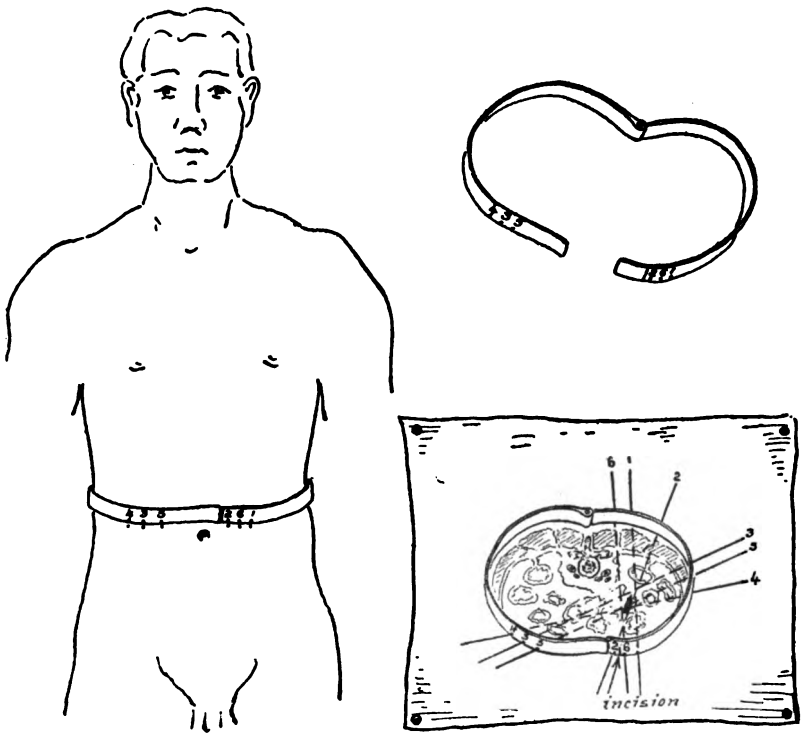

FIG. 2.

can readily be bent to obtain an exact contour of the body at the level of the fragment. This profondometer is then carefully fitted to the body at the level of the skin marks, which are always in a horizontal plane with the hinge situated at the midline behind. The point where the branches of the profondometer overlap is marked. The skin marks obtained by the ring compass are transferred to the profondometer and, at this point, the latter is carefully removed from the body without distortion and laid upon a sheet of paper, with the branches overlapping in the original position. To obviate the possibility of

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distortion in making localizations of larger parts of the body like the chest or abdomen, it is well to control the anteroposterior and lateral diameters by exact measurements made by the ring compasses which I have fitted with an arc and thumb screw for this purpose (Fig. 1). With a pencil, a tracing is made of the inner surface of the profondometer. This gives us the skin contour of a cross-section of the body at the level of the projectile (Fig. 2). The compass marks are likewise transferred to the tracing and identified by means of the numbers. With a ruler the imaginary diagonals, the ends of which are indicated by these marks, are converted into real diagonals. At the point of their intersection,

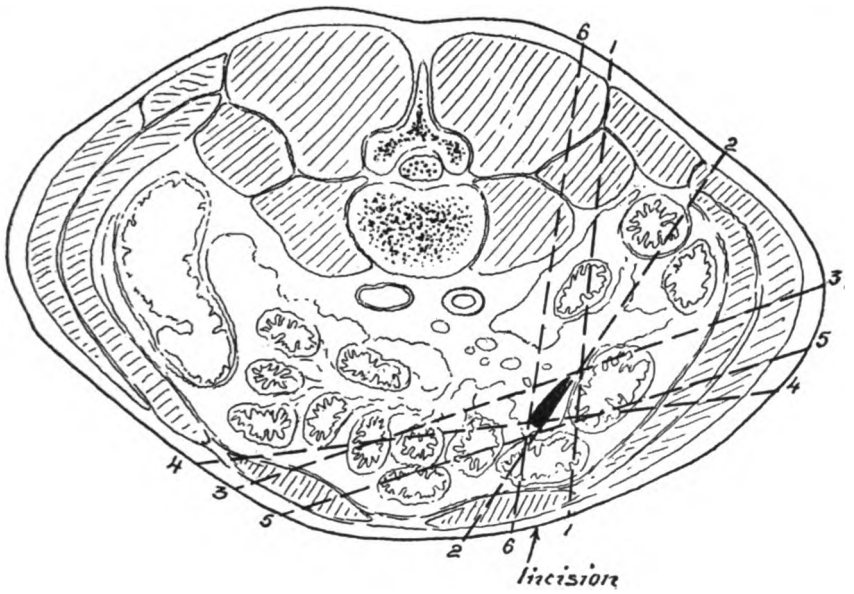

FIG. 3.

the exact position of the projectile is indicated. Where the projectile is fixed, the diagonals intersect at a single nodal point (Fig. 7), but where the ball has certain amount of motion as in a case where it is embedded in the root of the mesentery, for example, the diagonals form a box representing the limits of motion of the projectile as the posture of the patient is changed (Fig. 3). The foreign body is, accordingly, situated inside of the limits of this square.

The next stage in the localization is to determine the relationship of the projectile to the adjacent anatomical structures which are sketched into the tracing in outline (Fig. 3). For one who has no particular knowledge of cross-section anatomy, the excellent atlas of Eyclesheimer

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and Shoemaker may be employed. We have then a cross-section of the body showing the depth of the projectile and its relations to the skin and the anatomical structures about it. From such a chart, it is a simple matter to select the most advantageous incision from the surgical point of view. The profondometer is fitted upon the chart in its original position and the incision marked upon it (Fig. 2). It can then be replaced on the body of the patient so that the different marks register and the line of incision easily transferred to the skin (Fig. 4). The patient is then taken to the operating room and the extraction performed, the chart being utilized to determine by actual measurement the depth and position of the projectile.

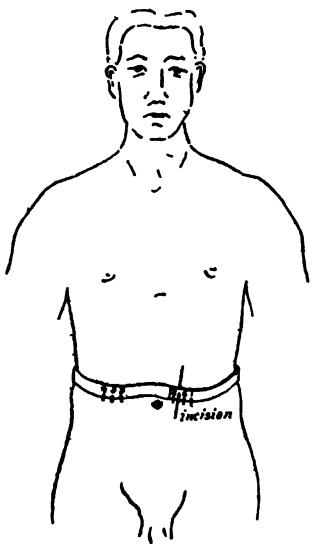

FIG. 4.

There are certain parts of the body where a simple horizontal localization sometimes does not give the data necessary for extraction, owing to the interposition of bony structures, and in these cases the method must be modified. Such an instance occurs, for example, where a shell fragment lies between the clavicle and the scapula adjacent to the brachial plexus and axillary vessels (Fig. 5). As the only operative route lies above the shoulder, this fact necessitates the addition of a right angled or vertical localization, starting from one of the original diagonals as a base line. I solved this problem by placing a malleable band of metal similar to the profondometer and moulding it to the shoulder in a position at right angles (Fig. 6) to the ends of one of the diagonals. This diagonal is then projected out to one side of the chart (Fig. 7) and the vertical contour of the shoulder obtained by a tracing of this second piece of moulded metal. This makes it possible to obtain accurate measurements from above and to select the proper incision from the surgical point of view. Another similar problem is presented by the case shown in Fig. 8, where a shell fragment lodged between the internal malleolus and the astragalus. This patient had been operated upon unsuccessfully in another hospital. The horizontal localization shows the interference of the malleolus with the selection of a direct incision, which should of choice be from below. By the use of a secondary band extending below the sole of the foot, as is shown in Fig. 9, not only the incision, but accurate measurements from it to the shell frag-

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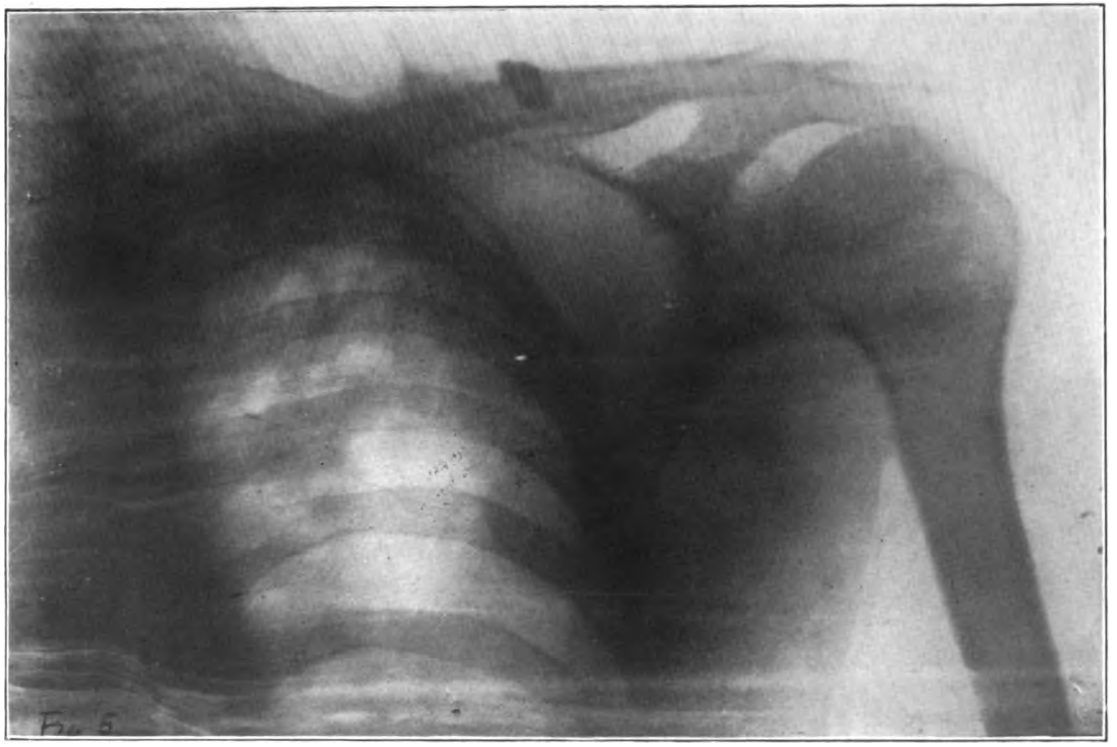

FIG. 5.

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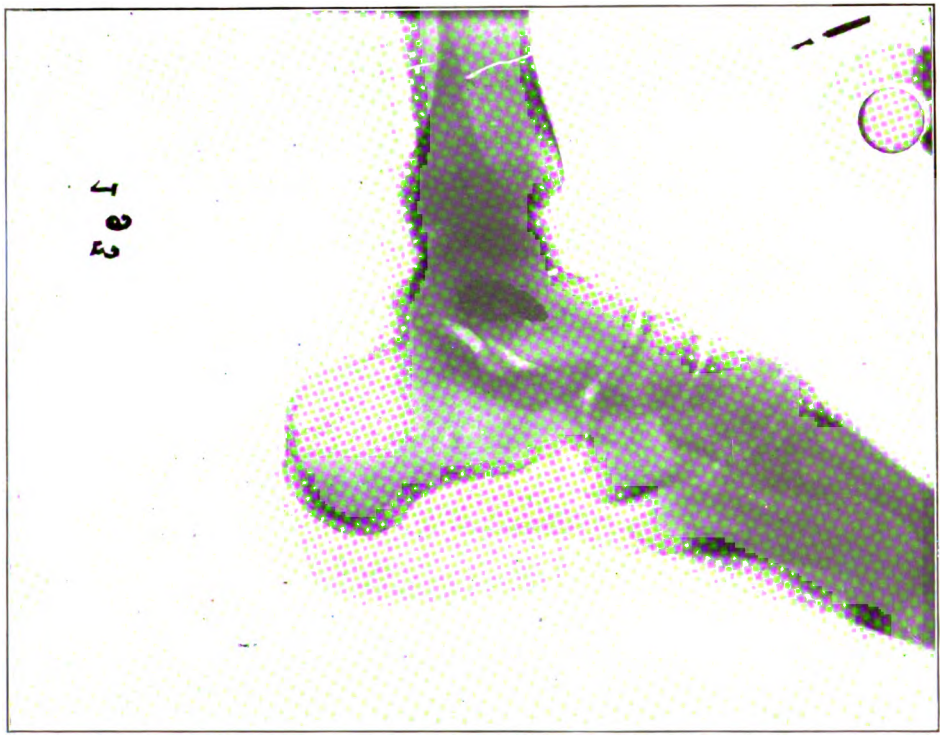

FIG. 8.

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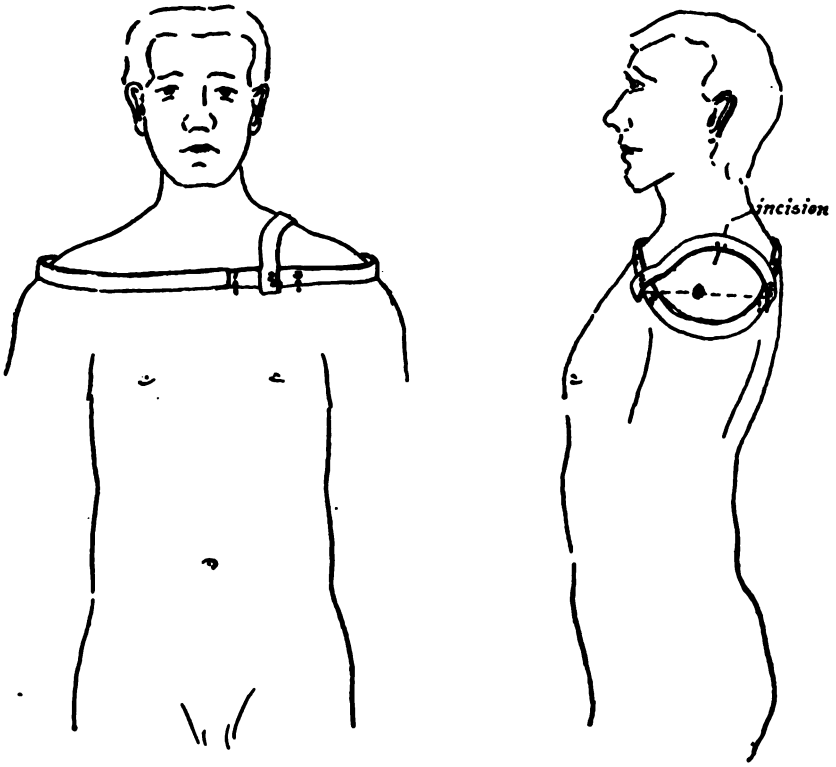

FIG. 6.

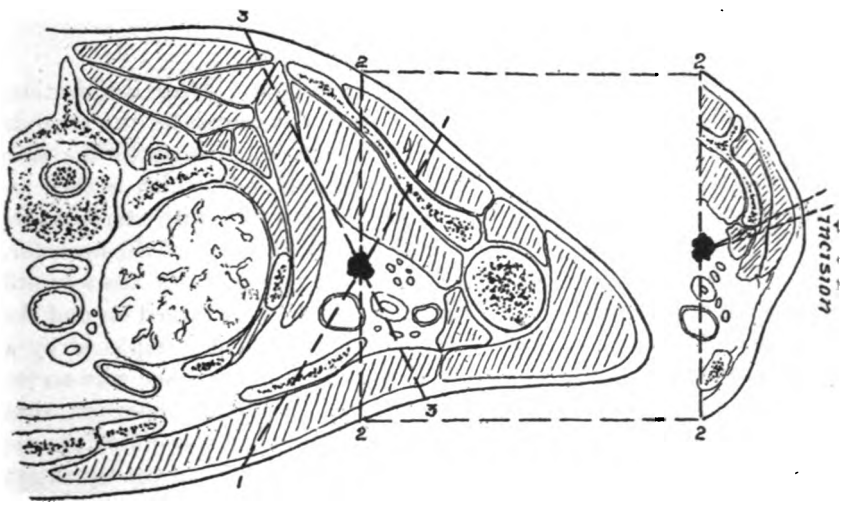

FIG. 7.

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ment are obtained. The charts with the right angled localization are given in Fig. 10. It can readily be seen that, with similar variations of this method, there is not a part of the body which cannot be rendered accessible and for which data for the extraction of projectiles cannot be obtained.

It is extremely convenient in most cases to have a definite guide to facilitate the search for the projectile during the actual operation. Undoubtedly, the most useful instrument of this type is that devised by Sutton, which may also be utilized as a localizer when the projectiles are situated in the muscular portions of the body. Sutton's localizer consists in a trochar and cannula which is introduced under

FIG. 9.

the skin previously anesthetized by novocain. After disinfection, the operator puts on sterile rubber gloves or manipulates the cannula by means of sterile artery forceps. It is plunged beneath the skin and the sharp trochar is removed from the cannula, which is then replaced by a blunt obturator. The field is covered with sterile towel and the floroscope employed. Under the direct vision of the operator, the cannula with its obturator is passed down through the tissues until it touches the projectile. At this point, the light is turned on and the obturator removed. In Sutton's original method, it is replaced by a piece of very fine piano wire with a crochet end. This fine wire serves as the surgical guide to the foreign body. We found, however, that when the field of operation was stained with blood, it was difficult to see the wire, which was also too fine to be felt readily as the operation proceeded into the depths. Accordingly, we substituted a small har-

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poon, about the diameter of the obturator, which is passed through the cannula, where it opens and becomes fixed in the tissues immediately about the foreign body. After the cannula is withdrawn, the projecting portion of the harpoon is bent over parallel to the skin surface and is

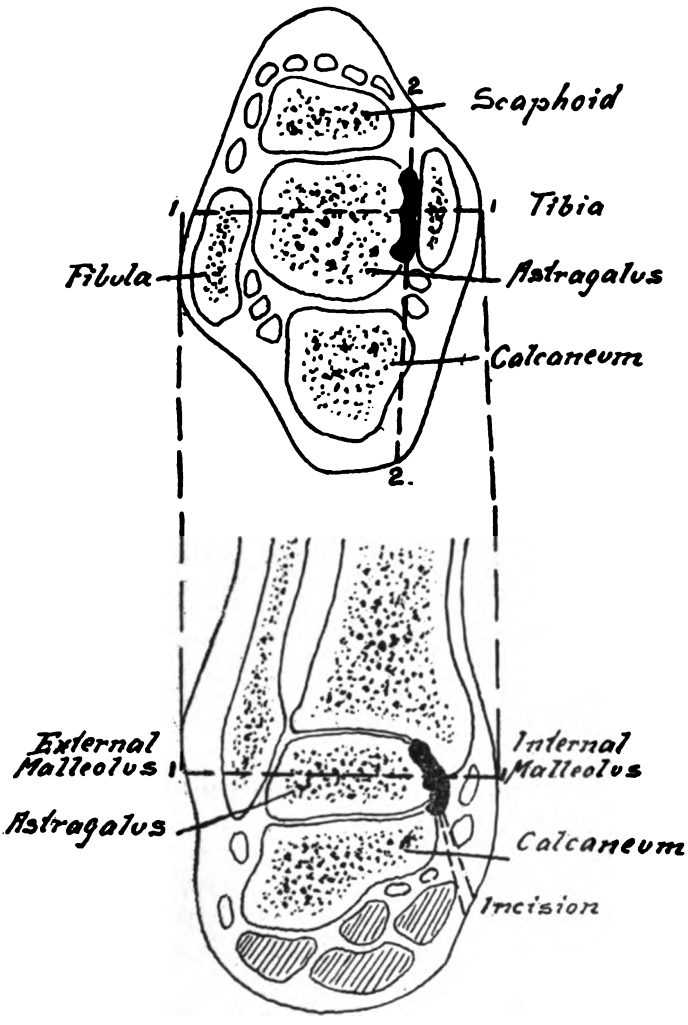

FIG. 10.

covered with a sterile dressing. Thereupon the patient is dispatched to the operating room. This larger guide can be seen with great ease and also felt during the operation, as it leads directly to the foreign body. It is quite obvious, however, that this method cannot be em-

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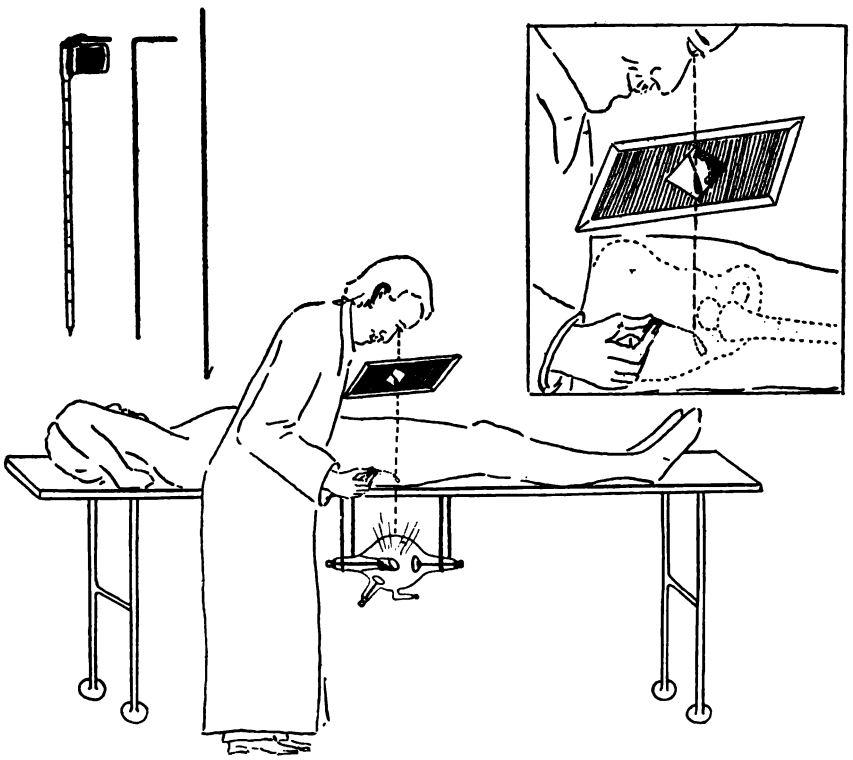

FIG. 11.

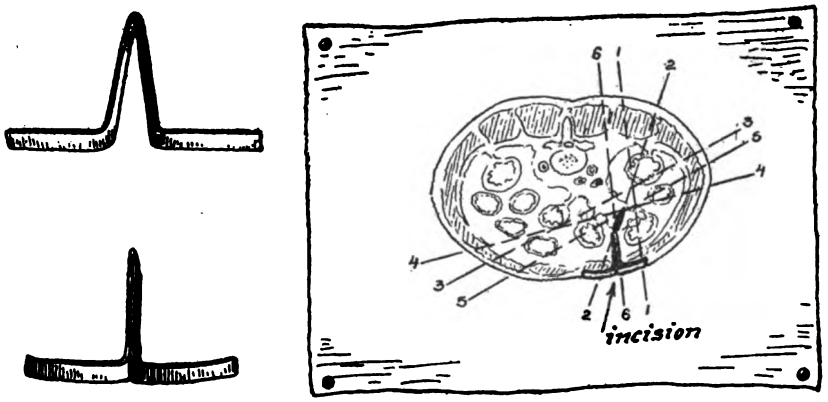

FIG. 12.

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ployed except in the extremities or in the muscular portions of the body, owing to the possible injury of important structures. Small nerves and vessels are pushed aside as the cannula and obturator are introduced. The localizer, harpoon, and the method of using them is shown schematically in Fig. 11.

To provide an operative guide for abdominal and chest cases or those with projectiles in the neck, where the Sutton localizer would be dangerous, a band guide was devised and used. This is made as follows: A small band of aluminum is bent double. It is then placed on the tracing (Fig. 12) with the bend at the position of the projectile extending in a straight line through the selected incision. At the skin level, the two arms are bent to conform to the skin contour. In this way,

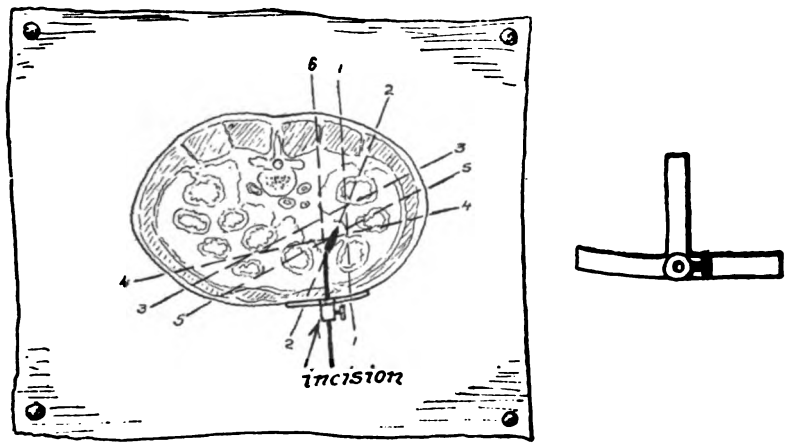

FIG. 13.

after the incision is made, the guide can be slipped into the wound and, when the proper depth is obtained, it should touch the projectile. As there is, however, certain possible inaccuracy in this intrument owing to the fact that the indicator can swing through the arc of a circle, a tripod guide and pointer were devised as an improvement. This is molded to the skin contour from the chart (Fig. 13) with the socket of the pointer lying in the plane of incision. It is then placed in the corresponding position upon the patient and three marks made upon the skin at the ends of the tripod (Fig. 14). The tripod is then replaced upon the chart and the pointer inserted and adjusted so that it reaches the depth of the projectile, where it is fixed in position by a thumb screw. Obviously, when this is utilized during the operation, the three marks upon the skin will always control the position of the pointer so that it

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leads directly to the foreign body. While these various guides are very convenient during the actual period of the operation, they are not absolutely essential. As a matter of routine, it has usually been our custom to utilize them, particularly the Sutton cannula and harpoon, in conjunction with the charts, because they facilitate and simplify the operation. Moreover, there is an additional factor of safety in utilizing one method to check the possible errors of another. With the combination of simple methods outlined above, we succeeded in removing every projectile for which there was a rational indication for intervention. In the majority of instances, the actual extraction is, in reality, a minor operation, as in over 80 per cent of the cases the extractions were done with local anaesthesia alone.

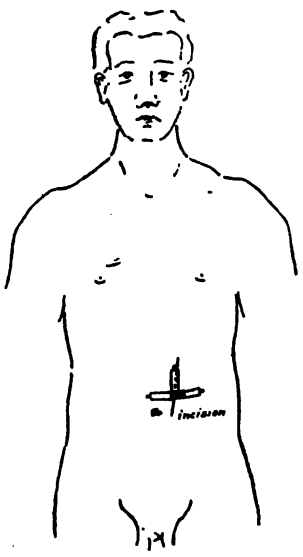

FIG. 14.

It may be of interest to append a few illustrative charts of localization in addition to those incorporated with the description of the method in order to show its adaptibility.

Fig. 15 shows an X-ray of the German ball lying apparently near the head of the femur. The localization chart, in this case (Fig. 16), gives the position of the ball in the gluteus maximus about 4 cm. behind the great trochanter. The insertion of the Sutton localizer and the harpoon guide in this case is shown in Fig. 11, after the selection of the point of incision by the Irvin profondometer. It was removed with novocain anesthesia in a few moments.

Fig. 17 shows the localization chart of a case with a shell fragment embedded in the internal condyle of the femur behind the reflection of the synovial membrane. Owing to the fact that there were no symptoms in this case and that the operation would inevitably be accompanied by some traumatism to the joint, an operation was advised against and the patient was given a copy of the chart in case the fragment ever caused him trouble.

Fig. 18 shows an instance of the localization of two fragments which were in the same relative position behind the intermuscular septum separating the adductors and the extensors of the thigh. One of these fragments was situated 4 cm. above the other.

Fig. 19 shows the localization in a case of a gun-shot wound of the knee where two masses were felt beneath the skin, both about the same

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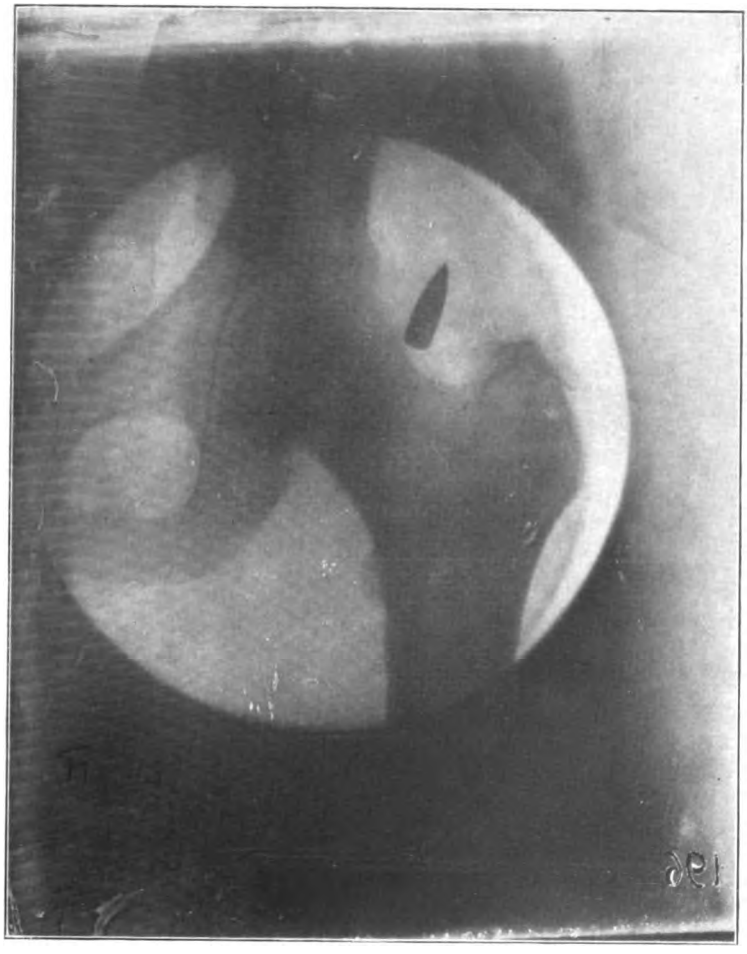

FIG. 15.

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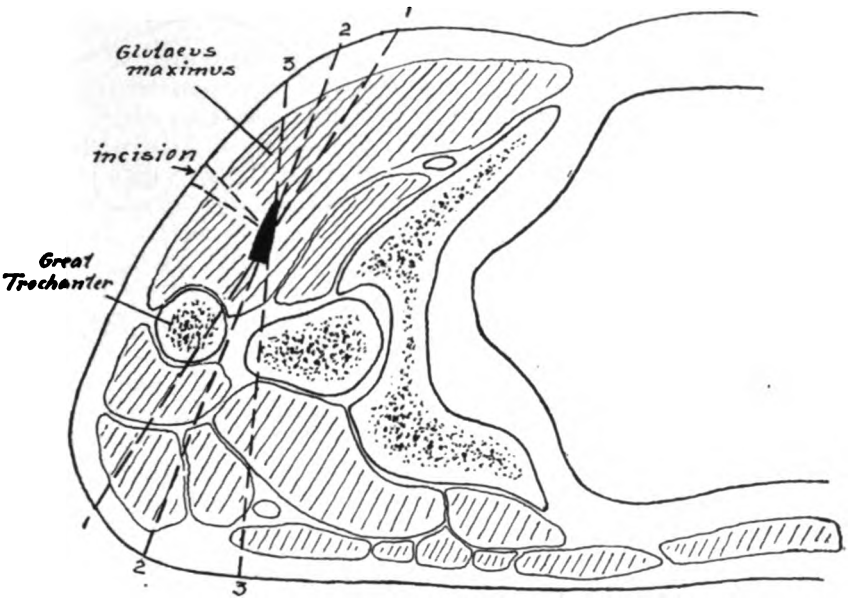

FIG. 16.

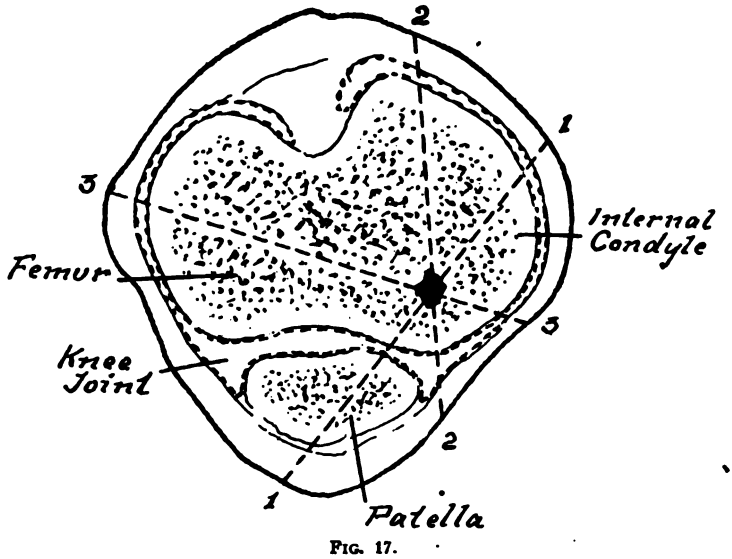

FIG. 17.

size. One proved to be the projectile and the other a zone of scar tissue where the ball had perforated the quadriceps tendon just above the patella.

I have reported a large series of localizations in various parts of the

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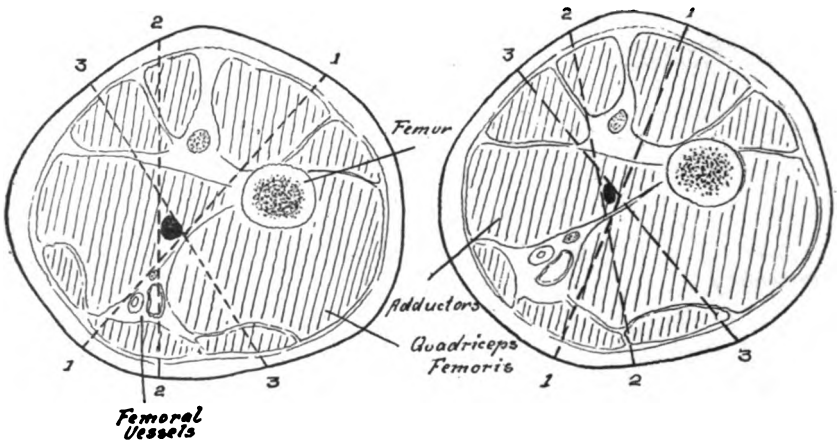

FIG. 18.

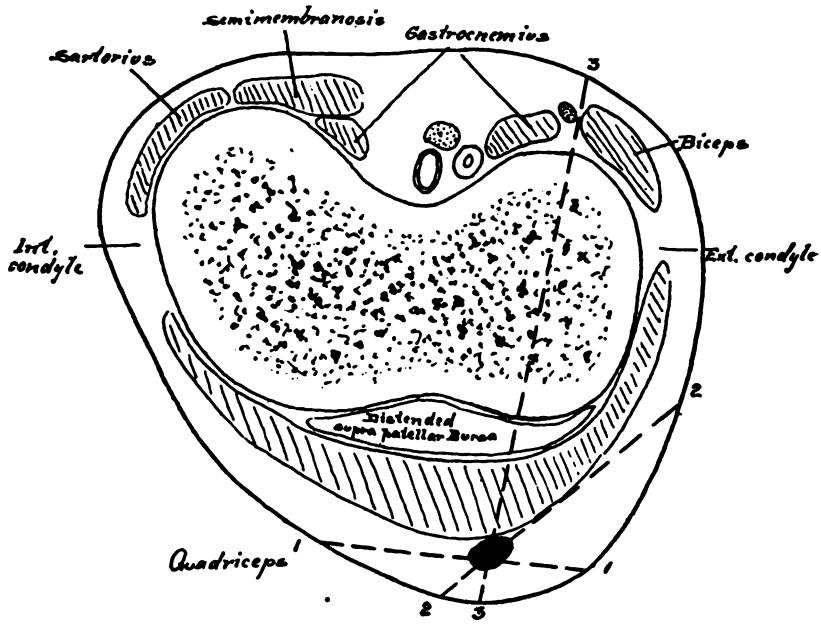

FIG. 19.

body in another place.[1] These cases are included simply to illustrate the adaptability of the combined methods especially for military surgeons.

[1] Flint, Annals of Surgery, 1916.

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EXPLANATION OF FIGURES

FIG. 1.—Diagram showing the method of applying the ring compass to obtain the skin marks representing the ends of the diagonals with the wooden stamps for marking the skin above.

FIG. 2.—Diagram showing the use of the Irvin profondometer in obtaining the cross-section tracings.

FIG. 3.—Localization chart of the wound of the abdomen with a German ball encysted in the mesentery. The diagonals indicate the mobility of the projectile. Compare with Fig. 7 to see the intersection of the diagonals when the projectile is fixed.

FIG. 4.—Diagram showing the replacement of the profondometer in order to mark the line of incision which has been selected from the localization chart.

FIG. 5.—X-ray of shell fragment lying between the clavicle and scapula adjacent to the brachial plexus and axillary vessels.

FIG. 6.—Diagram showing the method of obtaining the right angled localization for cases like that shown in Fig. 5.

FIG. 7.—Localization chart of the case illustrated in Fig. 5 with the vertical localization at the right.

FIG. 8.—X-ray of shell wound of the ankle; the fragment lying between the internal malleolus and astragalus.

FIG. 9.—Diagram to illustrate the method of selecting incision by means of right angled localization of the case illustrated in Fig. 8.

FIG. 10.—Localization chart of the case shown in Fig. 8 with the secondary or vertical localization below to show the method of selecting the incision.

FIG. 11.—Diagram showing the Sutton localizer with harpoon and the method in which it is employed. The case is that shown in Fig. 15.

FIG. 12.—Operative guide made of a band of aluminum employed in the case shown in Fig. 3.

FIG. 13.—Improved operative guide consisting of tripod and adjustable indicator.

FIG. 14.—Diagram showing the method of obtaining skin marks for the tripod guide.

FIG. 15.—X-ray of gunshot wound, with German ball apparently lying near the head of the femur.

FIG. 16.—Localization chart of the case illustrated in Fig. 15.

FIG. 17.—Localization of a shell wound of the knee with fragment lying in the internal condyle.

FIG. 18.—Localization chart of a case with multiple shell fragments in the thigh.

FIG. 19.—Localization chart of a case of pistol wound that has transversed the knee joint.

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SECONDARY SUTURES OF GUNSHOT WOUNDS AS AN ECONOMIC FACTOR IN WAR SURGERY

By D. PIERCE PENHALLOW, M.D.

Chief Surgeon, American Women's War Hospital, Paignton

Captain, Medical Corps, Mass.

(With fourteen illustrations)

IN WAR surgery we are dealing with numerous wounds which, while in some ways simulating those pertaining to civil life, usually are of a much more extensive type, and at the same time other factors not met with in civil life have to be considered. In civil practice, and especially in the practice of accident surgery, we aim to get the individual well as soon as possible and with a good functional result in order that he may return to his occupation with the least possible delay. In war surgery, on the other hand, economic factors other than that of time have to be taken into consideration, and we have to consider what will be the result of any given treatment of a patient not only as an individual but as a soldier, and whether or not when discharged from hospital he will be again able to resume the duties of a soldier and to sustain the hardships of a long march with its incident discomforts. It may be truthfully said that a war surgeon is not a humanitarian, in that his first object is to return to duty in the shortest space of time all men who will be fit to withstand the hardships of a campaign without finding it necessary to again report on the sick list on account of discomfort in an old, improperly healed wound.

One of the many types of wounds which the war surgeon is constantly coming in contact with is the so-called gutter wound, or wound which has perforated the soft tissues and carried away a considerable part of them, leaving an extensive ragged lacerated wound. Most of these wounds, if at all extensive, are apt to involve deeper structures, such as fascia and muscles, and if allowed to close in by granulation, may cause considerable impairment of function of the parts involved, together with resultant painful and adherent scars and contractures. In other words, a man so wounded, if allowed to heal simply by granulation, is apt to be incapacitated for further military service, as the scar incident to such a wound will be a source of considerable irritation, especially if that scar be so located that it will be traumatised by pressure or rubbing from clothing or equipment. Furthermore, if such wounds are allowed to close by granulation, it may take many weeks for them to heal, especially in the case of the more extensive wounds—a distinct

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economic loss of time. If, on the other hand, however, we can approximate the muscles, fascia and skin in such a way as to get practically a first intention wound, we have made a distinct gain in that we get, less impairment of function, a scar which, while it may be somewhat adherent, does not cover such an extensive area, will not be so painful, and at the same time will be less liable to trauma from the carrying of equipment than the more extensive ones. We eliminate, also, to a great extent, the possibilities of contracture and, furthermore, we make a distinct gain in time of healing for, whereas wounds which are allowed to granulate in, if at all extensive, may take several weeks and may require skin grafting, those which are sutured usually heal in two to three weeks and the result is a linear scar rather than a large, tender, adherent mass of cicatricial tissue. The soldier is then able to return to duty after a short time in a convalescent hospital, with his chances of having to report sick on account of the old wound considerably lessened or wholly absent.

Technique.—Realizing that all gunshot wounds are infected to a greater or less extent, there are several points to be borne in mind. When the soldier is first admitted the wound may be of such a nature that a secondary suture is not advisable; in other words, it may be foully septic and with considerable sloughing and necrosis of the traumatised tissues. All this should be thoroughly cleaned away, etherising the patient, if necessary, and the wound left wide open and dressed, preferably with hyperchlorous dressings, to stimulate granulations and get rid of any remaining slough and to minimize the infection. Later, usually within four days to a week, the wound presents healthy granulations and may then be sutured.

The procedure which we have been using at this hospital is as follows:

After the patient is etherised, the skin surrounding the wound is thoroughly cleaned with ether and iodine and the wound itself prepared in a similar manner; the edges of the wound are then excised, exuberant granulations are curetted away and the skin undermined far enough to allow of approximation of the edges; ends of muscles and the edges of the fascia have all loose or frayed protions removed and are then approximated loosely with catgut. Skin edges are held together by means of several Mattress' tension sutures of heavy silk and short pieces of rubber tubing or gauze placed under the ends of sutures to relieve undue pressure on the skin. Tension sutures are placed as far back from the skin margin as possible and the skin edges between the tension sutures sutured with horsehair or silkworm gut. Drainage is established either by a small drain from the lower border of the wound

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or by making a couple of stab wounds at the margin of the undermined skin flaps, and even though the wound be moderately infected, it heals very rapidly. Tension sutures are not left in any longer than is absolutely necessary on account of causing superficial sloughs in the skin, but as soon as the flaps have become adherent, the sutures are removed and tension relieved by adhesive straps.

The following illustrations will show rather well the wounds at time of entrance and the result at time of discharge:

Case 1.—Fig. A shows a rather extensive shell wound of left shoulder, scapula region, extending down through fascia and muscles. Wound at time of entrance rather dirty, with considerable sloughing tissue, which was removed, and wound was dressed with hot hyperchlorous dressings every four hours. A week later wound was sutured and three large heavy tension sutures put in to approximate skin. This wound was entirely healed, as is shown in Fig. B, ten days later, except for superficial sloughing areas where rubber tubing had been placed under the tension sutures. Patient sent to convalescent home and returned to duty a month later with wound healed, no impairment of function and no pain.

Case 2.—Fig. C shows a perforating bullet wound of back with a gutter wound on posterior surface of right upper arm, extending down to and severing some fibers of triceps. This wound was excised about two weeks after entrance and the result one month after operation is shown in Fig. D. No impairment of motion, no loss of flexion or extension.

Case 3.—Fig. L shows an extensive grenade wound of left buttock entering just posterior to great trochanter, destroying a large part of the gluteus maximus and also exposing the tuberosity of the ischium, which is seen just below the outer upper angle of wound in Fig. L. This wound extended on to the perineum and carried away tissue for nearly half way round the anus. Operation one week after admission: Edges of wound trimmed and skin undermined and edges approximated as far as possible, as is shown in Fig. M, which was taken three weeks after the first operation. At this time patient was operated upon again and skin edges still further approximated. One month later a third operation was done, when complete closure was made. Photograph of result (Fig. N) made one month after last operation shows only linear scars, except just at the border of the perineum where there is a small area of cicatricial tissue. Fig. P is a photograph of patient standing up, which shows the amount of loss of tissue in left buttock. Patient able to move round and sit down without discomfort and was discharged to convalescent home six weeks after the last operation.

Case 4.—Fig. E shows a superficial shell wound of the right forearm involving skin and superficial fascia, and Fig. F shows the result three weeks after operation.

Case 5.—Fig. G shows a shell wound of right groin and scrotum with testicle extruding from scrotal wound and covered by granulation tissues. Fig. H

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CASE I.

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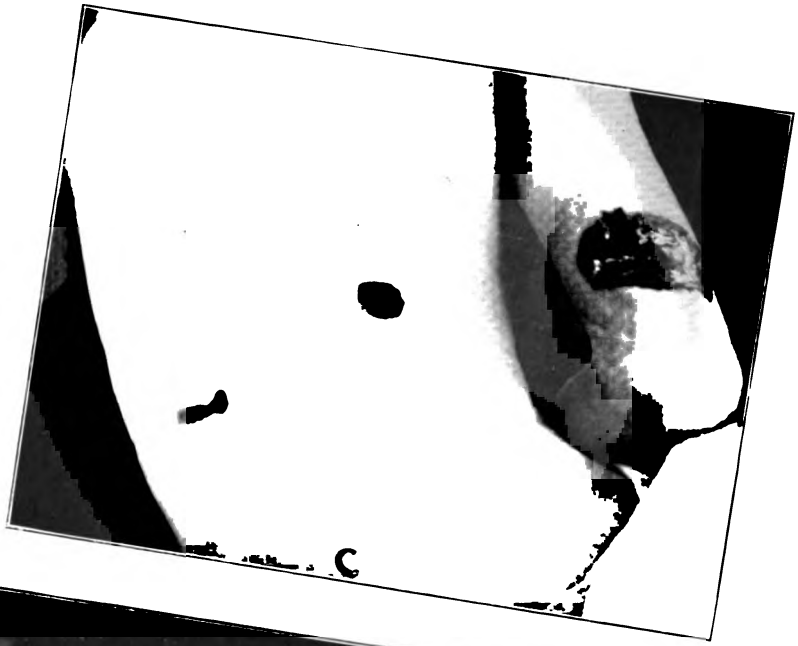

CASE II.

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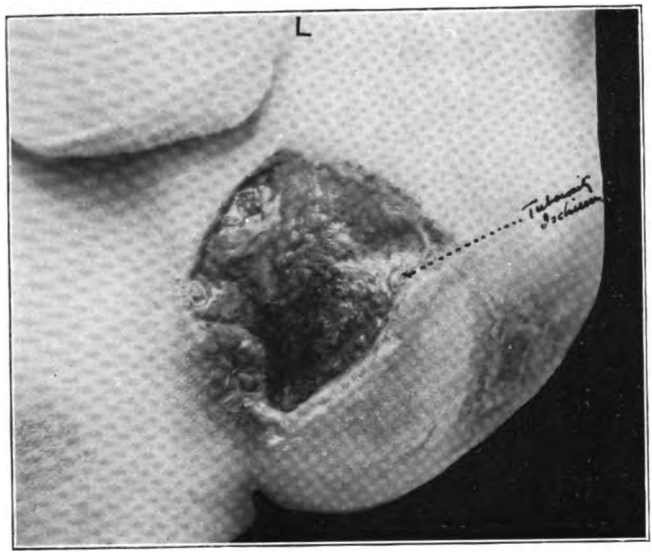

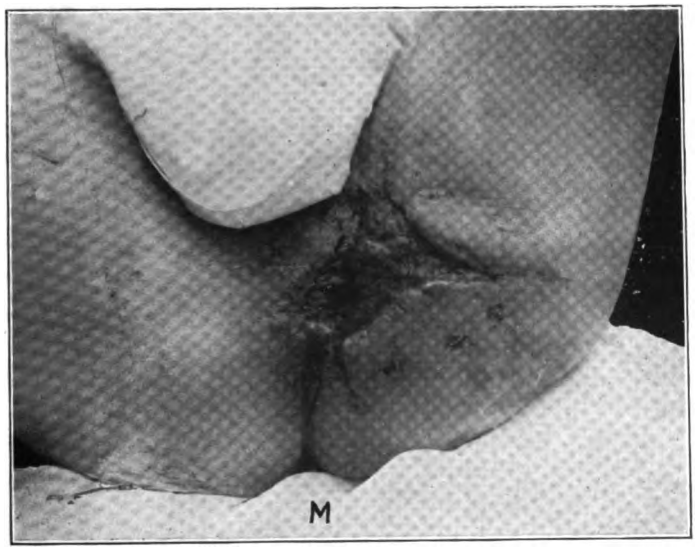

CASE III.

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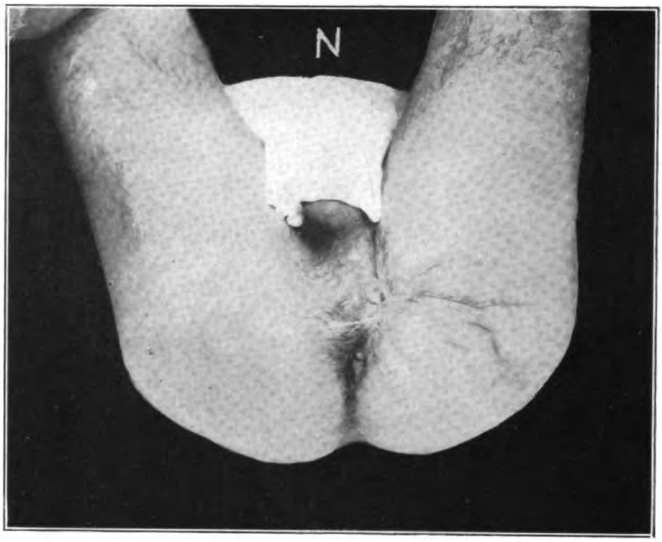

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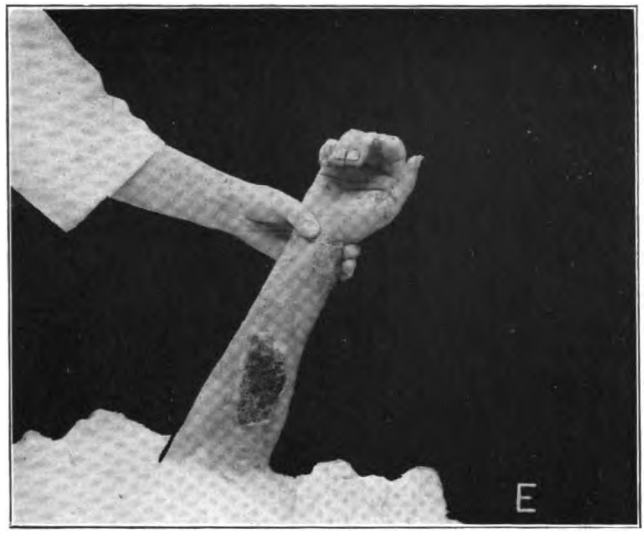

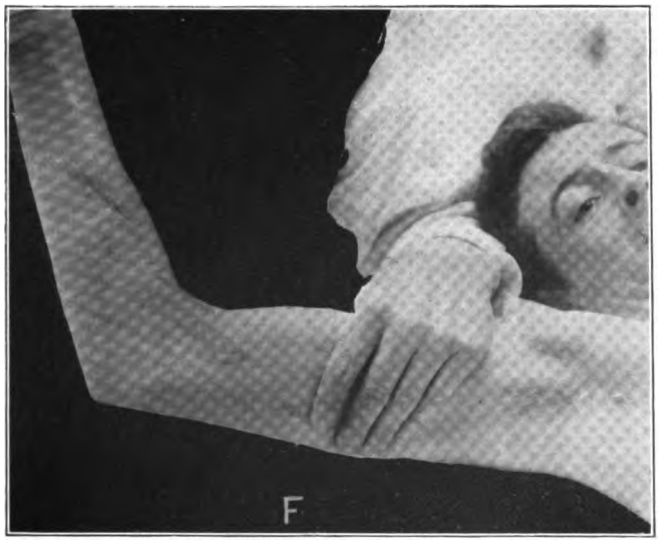

CASE IV.

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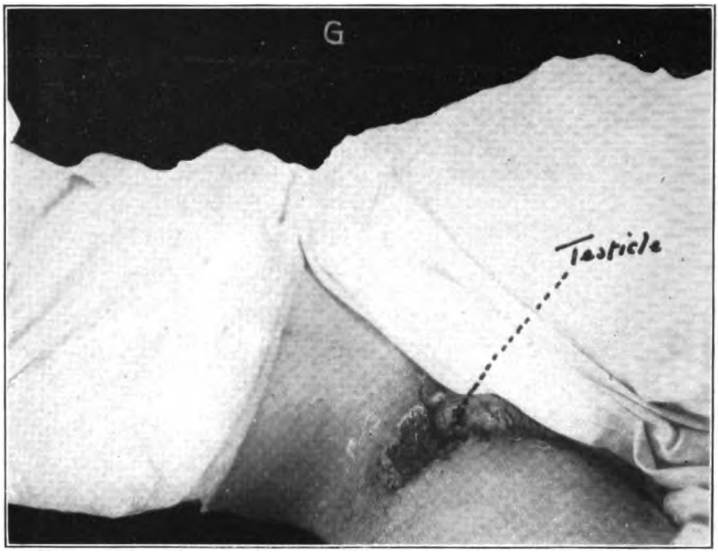

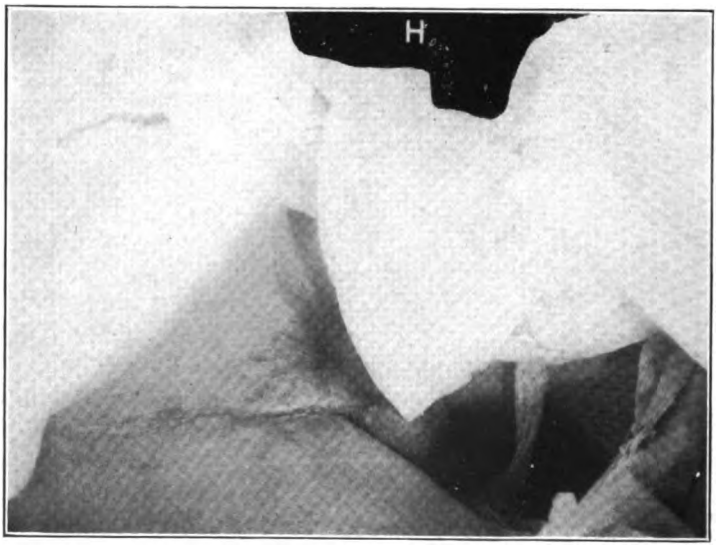

CASE V.

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Case VI.

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shows result three weeks after operation, at which time the testicle was removed and the scrotal wound and wound in groin closed.

Case 6.—Fig. J shows shell wound of back at time of admission and Fig. K the same on discharge after operation.

SUMMARY

1. Secondary sutures of extensive wounds should be done in all cases where there is much loss of tissue.
2. The wound should be thoroughly cleaned and healthy granulations allowed to appear before any operative procedures for closure are instituted.
3. A small gauze drain should be inserted either at lower angle of wound or by counter incision at border of undermined skin flap.
4. Tension sutures should be removed as soon as possible.

Bearing these few points in mind, it would seem that the converting of a large granulating gunshot wound into a first intention wound is a justifiable procedure, both from the point of view of time saved and of the results obtained.

The foregoing article and illustrations were received from the author last May, but due to stress upon the pages of THE MILITARY SURGEON could not be published until now, almost coincidently with the appearance of Dr. Penhallow's valuable work on Military Surgery, which is reviewed in this issue. The book adds nothing to the subject matter of the paper.

"Secondary Suture" is a well-established procedure, the object of which is to hasten healing by covering in the wound as much and as soon as justified. Its value in quickly healing extensive superficial, and even deep lesions and materially reducing the size of the cicatrix is well shown in the illustrations of Dr. Penhallow's cases, and its use in all suitable cases is clearly indicated.—ACTING EDITOR.

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THE SALINE TREATMENT OF INFECTED WOUNDS ON THE WESTERN FRONT

By Dr. WILLIAM ARTHUR CLARK

Late Director American Red Cross Belgian Unit at La Panne, Belgium

(With one illustration)

THE use of saline solutions in the war zone for treatment of suppurating wounds deserves special attention, as it is one of the methods which has, by extensive trial in the present war, been proved sound in theory and valuable in practice.

Although it is the main purpose of this paper to call attention to the value of hypochlorites, it is nevertheless thought advisable to present briefly the subject of salines as a whole and especially to mention the work of Sir A. E. Wright, now consulting physician to the British expeditionary force in France, to whom we are indebted for much of the theory of hypertonic and isotonic solutions.

The saline idea is not new. A strong solution of sodium chloride and citrate was in use at the Boston City Hospital in 1907, having been introduced there by Crandon. The practice there is to keep the dressings moistened with this solution by pouring it on every two hours or as often as necessary. However, it has never been widely used in America. The chlorinated soda solution known as Labarraque's has been used more or less indifferently by many surgeons for a number of years. The well-known "wet dressing" idea for infections has heretofore never taken into account the character of the solution employed for the wetting nor the necessity of reaching the remotest recesses of the wound. The indifference to these points in technique of preparation and application is undoubtedly responsible for the indifferent results.

It remained for the urgent necessities of war surgery, with its enormous numbers of frightful infections, to furnish a stimulus for investigation and a search for the best method of combating the sepsis of wounds. What has been demonstrated is valuable not only in military surgery but in all work for example in contract surgery (for war is only a monstrous contract with multiplied casualties), where compound fractures and other dirt-ground injuries are frequent.

Elementally there are three methods of treating potentially septic wounds: antiseptics, physiological methods and vaccines. These are suggested by Wright (1). The second method consists in opening and draining and bringing the bactericidal powers of the blood to bear

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upon the organisms, and to apply it rationally one should keep in mind the physiologic processes which transpire in a wound. On such questions as the viability of bacteria in blood fluids and unaltered lymph, the effect of isotonic and hypertonic solutions on the flow of lymph and growth of bacteria, Wright has worked, using his pipette technique similar to that which he introduced for the making of vaccines and determination of opsonic index. By mixing pus in graded dilutions with serum he found that streptococci flourish in undiluted serum and that staphylococci and others grow only when a more concentrated drop of pus is mixed with the serum. The latter condition is probably the result of a degenerative change in the serum. This change in the serous discharge from wounds is necessary before the abundant growth of organisms of a mixed infection can take place. Pure lymph obtained by means of a glass suction tube—"lymph-leach"—and uncontaminated by the contents of the wound is fairly clear and will grow streptococci in almost pure culture, but by adding trypsin it is converted into a suitable medium for the so-called "sero-saprophytic" organisms of a mixed infection. Trypsin is furnished in the wound by the breaking up of leukocytes and the exuded lymph undergoes by that means a digestive change which renders it suitable as a medium for a mixture of organisms.

Now it was determined that a 5 per cent salt solution would inhibit the emigration of leukocytes, that it would completely arrest the growth of pyogenic organisms, and that it would produce by physical laws an outward flow of lymph. It was also found that an isotonic (0.85 per cent) salt solution caused rapid emigration of leukocytes. For details of these findings the reader is referred to the rather voluminous papers of Wright (1).

The writer's practical summary of Wright's work is as follows: When a wound is bathed in all its recesses with a hypertonic salt solution, it becomes an unfavorable situation for the multiplication of organisms because the salt itself inhibits their growth, because there is the inhibitive effect of the anti-bodies of the lymph which is drawn out by osmosis, and because the inhibition of diapedesis precludes the liberation of trypsin necessary for saprophytic growth. It should be mentioned here that streptococcus is an exception to the general rule, as it thrives in lymph, and it is for this reason that isotonic solutions are best for irrigating wounds which show a more or less pure culture of that organism. This procedure, as stated above, causes an abundant emigration of leukocytes, which are the deadly enemy of streptococcus.

We now come to the methods of applying the theory—the character of the solutions and the methods of introducing them into the wound.

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There are two distinct ideas on the western front in regard to the use of salines. Following Wright, the English are employing the hypertonic chloride and citrate of sodium solution—5 per cent chloride and 0.5 per cent citrate. This may be called the physiologic method. The French and Belgians and some of the American units are using a sodium hypochlorite solution of isotonic strength. This is an antiseptic method.

Sandeman (2) states that fifteen years ago he used a 2 per cent solution of bleaching powder in the treatment of varicose ulcers. At the Boston city hospital the sodium chloride and citrate solution has been in use for at least nine years. It is applied by means of gauze packs saturated with the solution, no attempt being made to reach the deeper recesses of the wounds. Mitchell (3), at the Bradford Royal Infirmary, used a solution of hypochlorous acid made by diluting the "liquor sodae chlorinatae" B. P., with four parts water in the treatment of industrial injuries. He states that he has also used it full strength with gratifying results and that it is neither poisonous or irritating to the deep tissues and the skin.

At the large base hospital at Rouen (4) the wound is first washed with a solution of 5 per cent sodium chloride and 0.5 per cent sodium citrate. The citrate serves to prevent coagulation of the lymph (Wright). Continuous bathing in a hypertonic solution is obtained by introducing into each drainage tube a tablet composed of sodium chloride 10, sodium citrate 2, dipped in iodine just before insertion. If the tube is large, it is constricted at the end with a ligature. Small holes are cut in the tube to allow the dissolved salts to escape into the wound. If the wound is very large or very septic, some of the tablets are placed in the gauze, which is packed into it. These tablets, wrapped in gauze and sterilized, are also furnished to the first-aid stations where they are inserted into the wound within a few minutes after the soldier is hit. Such a tablet-and-gauze pack provides, by slow solution, a continuous supply of hypertonic solution for many days.

At the American ambulance in Paris, the hypochlorite treatment is used extensively. The solution employed there is known as Dakin's sodium hypochlorite and is prepared as follows(5):

1. To prepare ten liters of the solution weigh exactly:

Chloride of lime	200
Carbonate of soda, dry (solvay)	100
Bicarbonate of soda	80

2. Introduce into a 12-liter flask the 200 grams of chloride of lime and

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5 liters of ordinary water. Shake vigorously two or three different times and allow to stand over night.

3. Dissolve cold in 5 liters of ordinary water the carbonate and bicarbonate of soda.

4. Pour, one time only, the solution of soda salts into the flask containing the chloride of lime. Shake vigorously for a minute then allow to stand to permit the deposit of carbonate of calcium.

5. In about half an hour siphon the clear liquid and filter it through paper to obtain a perfectly limpid product, which must be preserved where it will be sheltered from light.

The antiseptic solution is then ready for surgical use. It contains about 0.5 per cent of sodium hypochlorite with small quantities of the neutral salts of soda. It is sensibly isotonic to blood serum. It must respond to the following tests made exactly as indicated:

Test.—Pour about 20 c.c. of the solution in a glass and drop on its surface a few centigrams of powdered phenolphthalein. Shake with a circular movement as for rinsing. The liquid must remain uncolored. A red coloration, more or less intense, indicates a notable quantity of free alkali due to faulty technique.

Titration.—Measure 10 c.c. of the solution and add 10 c.c. of distilled water, 2 gm. of potassium iodide and 2 c.c. of acetic acid. Pour into the mixture a decinormal (2.48 per cent) solution of hyposulphite of soda up to decoloration. Let N be the amount in cubic centimeters of hyposulphite employed. The content of hypochlorite of soda in 100 c.c. of liquid will then be represented by the equation

$$X = N\ 0.037$$

If in urgency one is obliged to grind the chloride of lime in a mortar, it should be done only with water, never with the solution of sodium salts. Because of its tendency to hydrolytic dissociation, the solution must never be heated.

In the hospital of the Belgian Red Cross at La Panne, from which the author's cases are reported, the technique for the employment of this solution is as follows:

All wounds at entrance were cleaned with ether, preceded in some instances with soap and water if the part was especially dirty with mud. Loose, ragged tissue, which obviously could not live, including the rough blackened edges of the skin, was cut away. If loose bone was present all of it was removed, but this procedure was condemned by the American Ambulance. The removal of all loose bone and smoothing of ends to the extent of leaving wide spaces between fragments may aid in the control of sepsis, but union is uncertain, sometimes impossible without the aid of a subsequent graft. In all cases which showed more than a mere superficial wound, except some special cases, such as brain and

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lungs, a so-called Carrel tube was inserted for the introduction of hypochlorite solution prepared as described above. These tubes (Fig. 1), devised by Dr. Alexis Carrel, are for carrying the solution to the deep recesses of the wound and must not be confused with drainage tubes, which, of course, had to be used in addition. They are made from ordinary rubber tubing of 4 mm. caliber in various lengths from 10 to 30 cm., tied off at one end and perforated at the same end with from ten to thirty holes (depending on the length of the tube) about one millimeter in diameter. These holes are made with a harness maker's plier-punch through both sides of the tube at once. Around this perforated portion is sewed a piece of Turkish toweling, covering the tube completely over the tied-off end, to a point well above the last perforation. It is important that all the perforations be covered for, if some of the upper ones are not covered, most of the solution will escape through them and not penetrate to the depths of the wound as intended. For the same reason, it is essential to see that the tube is inserted into the wound completely, until the entire perforated and gauze-covered portion is buried in the tissues. The length of the tube must be carefully chosen to suit the depth of the wound. It must reach with its tied-off end the fundus of the pocket into which it is inserted, and the covered portion must not project beyond the tissues. The unperforated, uncovered part is allowed to project through the dressings so that it can be connected with the irrigation reservoir or be available for the nurse to inject the solution at ordered intervals. Many such tubes are necessary for extensive wounds in which there are many pockets.

In grave cases the Carrel tube is connected up with a reservoir containing the Dakin's (called Carrel's at La Panne) solution and a continuous instillation maintained. The rate of flow is slow, about 30 c.c. per hour for each tube. In less severe cases it is sufficient to inject from 5 to 10 c.c. of the solution into each tube every two hours. If the technique has been without fault, the tissues of the wound will be completely bathed in the hypochlorite solution and the infection will be aborted.

Plain tubes of larger caliber are used to carry away the discharges. The walls of the wound, after such continuous irrigation, have a bright, red, healthy appearance and the pus, if any, is more or less accumulated in small lumpy drops or chunks and is easily irrigated out at dressings. It was the practice to irrigate at dressings, with hydrogen peroxide, provided the wound was well open. This was because of the necessity of constant vigilance and prophylaxis against infection by the gas bacillus.

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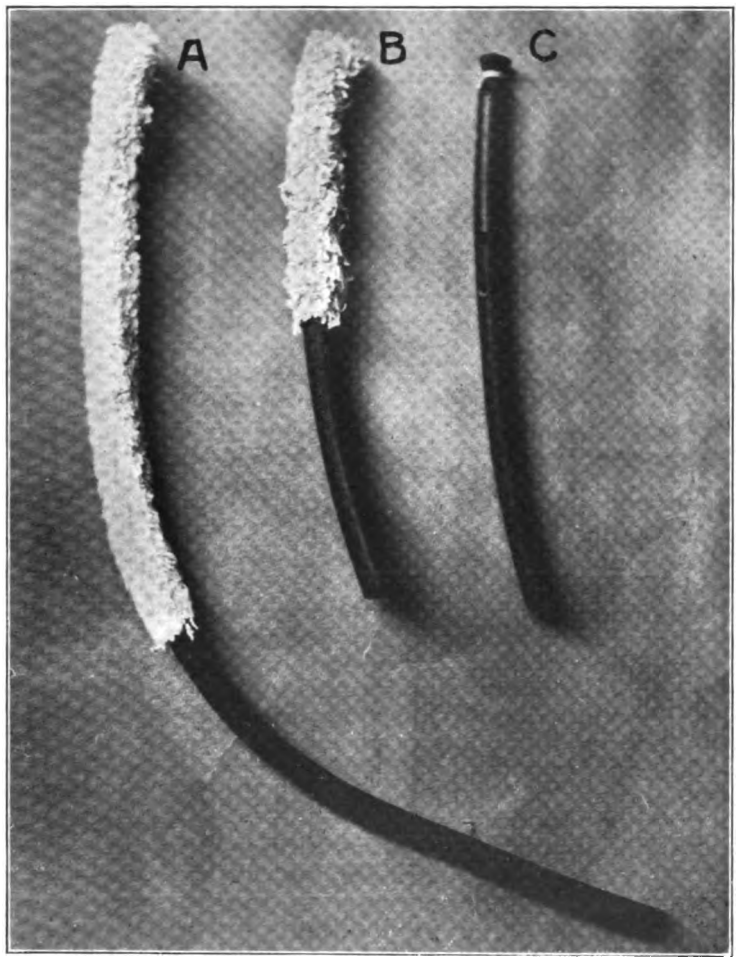

FIG. 1.—CARREL TUBES. A AND B, COMPLETE, READY FOR INSERTION. C, WITH COVER REMOVED TO SHOW PERFORATIONS AND CONSTRICTED END.

(To face page 282.)

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It is difficult to offer evidence of true scientific value regarding the efficacy of any form of treatment, for there is always the impossibility of having two exactly similar cases for comparing methods, and there is always the question, after a good result, whether such result was really due to the specified treatment or to other agencies. The real criterion of the value of a method is the extent to which it is used. If it becomes universal, it must be of real value.

Case 1.—Compound fracture of both bones just above left ankle by rifle bullet. On the second day large incisions were made at the wounds of entrance and of exit and some loose bone removed. Carrel tube inserted and hypochlorite solution introduced by continuous instillation. The next day the incisions were enlarged and more loose bone removed. Large drainage tubes permitted the escape of pus which had now formed. After a few days of continuous irrigation, the walls of the wound appeared bright red with granulation tissue and bled at every dressing. Pus diminished rapidly and temperature stayed down near normal. Hypochlorite treatment continued for about two weeks, at the end of which time the wound was growing smaller and discharge of pus was very small. Owing to extensive loss of bone the patient was unable to walk with crutches for about two months, but as far as the septic condition of the fracture was concerned it rapidly cleared up under the treatment.

Case 2.—Lacerated wound of right arm by shrapnel. No bone injury. Wound cleaned and particles of shrapnel fragments and dirt removed. Carrel tube inserted and injections of hypochlorite given every two hours. After the initial edematous swelling of the upper arm, which subsided in twenty-four hours, the wound progressed with healthy granulations and very little pus formed.

Case 3.—Compound fracture of both bones left leg by rifle bullet. Carrel tube inserted and solution started four days after entrance at rise of temperature. From then on temperature remained below 37.8° C. Record seventeen days later reads, "wounds almost healed."

Case 4.—Fracture of radius and ulna by rifle bullet. Incision made over wounds of entrance and exit and loose bone removed. Carrel tube and drainage tube placed through. Continuous instillation for two days, then every two hours with hypochlorite of soda solution. Temperature remained down and discharge of pus was very slight.

Case 5.—Bullet wound of thigh with fracture of femur at upper third. Wounds enlarged and two Carrel tubes inserted, one from each side through the bone fragments. Hypochlorite continuous instillation started. During the first ten days the patient had two secondary hemorrhages and the tubes were removed because it was thought that they might have caused an erosion. The day after the second hemorrhage the patient died suddenly after being moved on to the table for dressing. The wound at this time was free from pus and always had been, and the walls were beginning to redden with granulations.

Case 6.—Perforation of right chest by rifle ball with fracture of lower end of scapula. The posterior wound was enlarged and loose parts of the shattered

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scapula removed. The subcutaneous and muscle laceration was quite extensive owing to the explosive effect of the bone when struck by the bullet. Each of the numerous pockets was supplied with a Carrel tube leading into its fundus and hypochlorite solution given continuously in the deeper ones and every two hours in the more superficial ones. The anterior wound was not important. There was practically no pus formation and after about one week the hypochlorite was discontinued. The internal chest condition of this patient was, of course, more grave than that of the outer chest wall, and he developed severe coughing attacks with rise of temperature. The Carrel tubes were, of course, not inserted beyond the ribs. Unfortunately I am unable to report the final outcome of this internal condition as the patient passed out of my control, but the external muscle and bone wounds were free from sepsis under the hypochlorite treatment.

These few cases chosen at random are representative of the work at La Panne and of the results obtained by this method.

There is some danger in placing a tube near blood vessels. This caution is suggested by Case 5. The rough toweling which covers the tube is probably responsible for the erosin and consequent hemorrhage in such cases, as other similar instances have been noted.

Should there be a dermatitis of the surrounding skin, there has been a fault in technique in preparing the solution—it has not been sufficiently neutralized. This dermatitis, a sort of scald, can be partly controlled by vaseline or zinc oxide ointment applications, but even that is not satisfactory on account of the saponification with the sodium salt. The best procedure, when these burns are frequent, is to change solutions.

Carrel (6) reports a case in which a comparison was made as the result of an accident. There were two wounds in the same region. A Carrel tube was introduced into each wound and hypochlorite instillations started. One tube fell out and the wound became red, painful and suppurating, while the wound in which the tube remained in place did not suppurate nor was it painful or reddened.

Dalton (7) states that in fifty-seven cases on one of the ships of the British Navy the results with sodium hypochlorite were uniformly good, that it is "the best antiseptic so far used on this ship," that it is cheap, non-toxic, non-irritating and can be easily renewed by nurses or orderlies. Primrose (8) claims to have found "the hypochlorous acid solution wonderfully effective." According to Dakin (9) the clinical results obtained during the last six months by many observers in different hospitals permits the belief that the solution has a real value. He believes that the antiseptic action of the hypochlorites is due to their capacity for attacking proteins and related bodies with the formation of substances containing chlorine linked to nitrogen. The

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hypochlorite of soda is antiseptic in a strength of 1 : 500,000 according to his tests, but in the presence of blood serum a strength of 1 : 1,500 is required.

Recently Morgan (10) has expressed disagreement with Wright's views on hypertonic solutions. He states that physiologic salt solutions do not cause a "chemiotactic migration" of leukocytes, and that hypertonic salines, by suppressing the activities of leukocytes, render ineffective the only defense there is. He concludes from laboratory experiments, in which he mixes pus in various dilutions with antispeptics, that neutral hypochlorous solutions are by far the most potent of the antiseptics usually employed and are effective in 1 : 800 available chlorine, or 1 : 4 of the strength usually dispensed.

Wright (11) has subsequently admitted that one disadvantage of the hypertonic solutions is that they repell leukocytes and prevent phagocytosis and now suggests that it is well to substitute 0.85 per cent for the 5 per cent after all induration and sloughs have disappeared.

The hypochlorite solution is much more widely used on the western front than the saline solutions of Wright; even in the large British base at Etaples the salines are not used to the exclusion of Dakin's solution.

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THE OCCURRENCE OF ENDAMEBIC DYSENTERY IN THE TROOPS SERVING IN THE EL PASO DISTRICT FROM JULY, 1916, TO DECEMBER, 1916

By Major CHARLES F. CRAIG

Medical Corps, United States Army

(From Department Laboratory No. 2, Southern Department, U. S. Army, El Paso, Texas)

THE occurrence of 156 cases of endamebic dysentery among the troops serving in the El Paso District and the Punitive Expedition in Mexico was considered of sufficient importance and interest to merit an inquiry as to the epidemiology of the outbreak, which occurred between July, 1916, and November, 1916. To this end a blank was prepared and each patient was seen and personally asked the questions appearing upon it. A copy of the blank follows:

ENDAMEBIC DYSENTERY INQUIRY BLANK

1. Name. Rank. Company. Regiment.
2. Previous service.
3. Length of present service.
4. Previous residence.
5. Previous attacks of diarrhea and dysentery. When and where?
6. Place and date of present attack.
7. Time after arrival at station where this attack occurred?
8. Date regarding infection:
   - (*a*) Have you eaten raw food in Mexican resorts?
   - (*b*) Exposure of food to flies.
   - (*c*) Source of water used prior to infection.
   - (*d*) Have you been on detached service?
   - (*e*) Intimate contact with Mexican population.

Of the 156 cases of endamebic dysentery that were confirmed microscopically, by finding *Endameba histolytica* in the feces, 118 occurred in soldiers in the El Paso District and 38 in soldiers serving in the Punitive Expedition in Mexico. Of the 118 cases occurring among the troops in the El Paso District it may be stated that, so far as can be ascertained, all but five originated in the camps in or near El Paso, while of the 38 cases occurring among soldiers in Mexico, all but 10 originated in that country.

The parasite concerned in the etiology of all of these infections answered in both fresh and stained preparations to the well-known pathogenic species of endameba, *Endameba histolytica*, and there has

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been no reason to believe that any other species was concerned in the infections observed here. Clinically, the infections appeared milder than those that I have observed from the Philippines during the period that active military operations were being carried on in that country, but, in my opinion, the early recognition of the infections observed here and prompt treatment with emetine is entirely responsible for the mild character of the symptoms noted in the vast majority of the cases occurring at El Paso. However, there were severe infections presenting all of the classical symptoms of endamebic dysentery, and three deaths resulted from the disease or its complications.

I do not believe that the generally milder type of infection noted here had anything to do with a less virulent type of *Endameba histolytica*, as has been suggested, but that the same severe type of infection would have been observed, as was so common in the Philippines, had the patients been allowed to go for weeks undiagnosed or improperly treated, as was often the case in the islands, or had they been treated with less efficient drugs than emetine.

In considering the epidemiology of this outbreak of endamebic

TABLE 1.—*Organizations in Which Cases of Endamebic Dysentery Occurred and Number of Cases in Each*[1]

Organization	No. of cases	Organization	No. of cases
Truck Companies	17	17th U. S. Infantry	1
Medical Department	11	18th U. S. Infantry	1
Engineers	1	20th U. S. Infantry	4
Signal Corps	3	21st U. S. Infantry	1
5th U. S. Cavalry	11	23d U. S. Infantry	1
7th U. S. Cavalry	1	24th U. S. Infantry	1
8th U. S. Cavalry	9	34th U. S. Infantry	3
11th U. S. Cavalry	1	2d Ga. Infantry	2
12th U. S. Cavalry	2	5th Ga. Infantry	1
13th U. S. Cavalry	2	8th Mass. Infantry	3
1st Mass. Cavalry	7	9th Mass. Infantry	4
1st Pa. Cavalry	1	31st Mich. Infantry	5
1st Rhode Island Cavalry	5	32d Mich. Infantry	7
4th U. S. Field Artillery	3	2d Ohio Infantry	1
5th U. S. Field Artillery	3	4th Ohio Infantry	1
6th U. S. Field Artillery	2	6th Ohio Infantry	1
8th U. S. Field Artillery	3	2d Pa. Infantry	2
1st Ohio Field Artillery	2	3d Pa. Infantry	1
1st Mass. Field Artillery	6	6th Pa. Infantry	2
1st Pa. Field Artillery	1	8th Pa. Infantry	3
6th U. S. Infantry	4	16th Pa. Infantry	2
7th U. S. Infantry	3	18th Pa. Infantry	1
16th U. S. Infantry	2	2d S. C. Infantry	4

[1] This table should also contain: 1st Kentucky Infantry, 2 cases; and 2d Kentucky Infantry, 1 case.

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dysentery the answers to each question upon the blank will be given, followed by a general discussion of the data obtained, and certain recommendations regarding the prevention of this very serious disease.

Question 1.—This concerned the name, rank, and organization to which the infected individual belonged, and Table 1 gives the organizations affected, together with the number of cases in each organization.

Upon reference to this table it will be noted that the infection occurred about equally, so far as the total number of cases is concerned, in the mounted and unmounted troops, the mounted having sixty-two cases and the unmounted sixty-one cases, but the mounted organizations, considered separately, suffered more severely, the separate organizations having more cases, with the exception of the 31st and 32d Michigan Infantry. The Truck Companies, while not mounted, performed duties of such a nature that they would be much more exposed to infection than the average organization, as they were in all parts of the city and in all of the camps to a certain extent, and undoubtedly were exposed to contaminated food and water to a greater extent than soldiers whose duties did not take them into all parts of the infected territory and who spent most of their time in one camp. The greater incidence of endamebic dysentery in the mounted organizations is probably explained by the greater incidence of the fly in such organizations, as will be noted later.

Of the mounted organizations, the 5th Cavalry had eleven cases, all developing in Mexico, at El Valle; the 8th Cavalry, at Fort Bliss, had nine cases; the 1st Massachusetts Cavalry, five cases; the 1st Rhode Island Cavalry, five cases; the 1st Massachusetts Field Artillery, six cases; and the greatest number of cases among the infantry regiments occurred in the 31st Michigan Infantry, seven cases occurring in this regiment. The other infected organizations had a smaller number of cases.

Company Infections.—In most of the organizations there is no evidence that company infection had much to do with the spread of the disease, for, in the vast majority of instances, only one case occurred in a company. However, in the case of the truck companies, there is good reason to believe that this factor was of importance, for six cases occurred in Truck Co. No. 20; five cases in Truck Co. No. 24; and four cases in Truck Co. No. 16. It is interesting and very important, in this connection, to know that in all of these truck companies a "carrier" or "carriers" were found, who were apparently healthy, but who presented the cysts of *Endameba histolytica* in their stools. Thus, in Truck Co. No. 20, where six cases occurred, two "carriers" were found; in Truck

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Co. No. 24, one "carrier" was found; and in Truck Co. No. 16, two "carriers" were discovered.

In the instance of these companies I am satisfied that the "carriers" discovered were the source of much of the infection in these organizations, as their removal to the hospital resulted in the disease practically disappearing from the Truck Trains Camp. Not only were these "carriers" probably responsible for the infection occurring in their own camp, but the nature of their duties taking them to the other camps in and around El Paso, it is not beyond reason to believe that they might also have been responsible for some of the infection in other camps.

A few other companies showed two infections in the same company, but in none was company infection as marked as in the truck companies mentioned. As an illustration of how widely the disease was distributed through the organizations at El Paso, the 8th U. S. Cavalry may be instanced, where one case occurred in the Headquarters Detachment; one in Company B, one in Company E, one in Company I, two in Company F, two in Company K, and one in Company M. From this it will be seen that endamebic dysentery was not a company disease in the 8th Cavalry and this statement is true of all of the infected organizations, with the exception of the truck companies

Contact Infection.—So far as could be ascertained, there is no evidence that the disease was spread by direct contact among the troops in and around El Paso, as the cases were generally widely separated, in the vast majority of instances, even in the same regiment. The only instance in which contact infection might be suspected is in the truck companies, where several "carriers" were discovered, but inquiry elicited the fact that these "carriers" did not occupy the same tent with any man who afterward developed the disease, and that in no case was a "carrier" employed in the kitchens or mess tents of the organizations concerned. While these men were potential sources of infection by direct contact, in this particular instance there is absolutely no evidence that they actually caused the disease in this manner. On the other hand, I am satisfied that they did cause infection indirectly through the agency of flies, as will be noted later.

Question 2. Length of Previous Service.—It should be noted here that to most of the following questions we were able to obtain data in only 100 cases for the reason that, before the inquiry was started, many of the patients had been discharged from hospital and their organizations either ordered away from El Paso or relieved from duty upon the border.

To question 2, eighty of the patients replied that they had no previous service, while twenty stated that they had previous service. Of

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the latter, six had three years; two, six years; two, four years; one, eight years; two, nine years; two, twelve years; while the remaining five had longer previous service.

As regards the effect of length of previous service upon the incidence of endamebic dysentery it may be stated that all but three of the cases, twelve in number, that evidently originated elsewhere than in El Paso or Mexico, were in soldiers who had long periods of previous service, and it is also interesting to note that all of these men had served in the Philippine Islands and stated that their infection was contracted there and that they had never fully recovered. In three of these cases the infection dated back for ten years.

It will thus be seen that previous service in regions where this form of dysentery is endemic should be carefully considered in the study of the epidemiology of an outbreak in any locality. However, in this particular epidemic it is evident that this factor was of little importance, for of the 100 cases under discussion, no less than seventy had less than six months' service, and none of these soldiers had served in localities where endamebic dysentery is other than a very rare disease.

TABLE 2.—*Previous Residence of Soldiers Suffering from Endamebic Dysentery.*

State	No. of cases	State	No. of cases
Alabama	1	Ohio	5
Arizona	4	Pennsylvania	13
California	1	Rhode Island	5
Connecticut	1	South Carolina	4
Georgia	1	Texas	8
Illinois	2	Oregon	2
Massachusetts	20	Virginia	2
Michigan	12	Washington	2
Minnesota	1	Indiana	2
New Mexico	1	Kentucky	2
New York	2	Philippine Islands	9

Question 3. *Length of Present Service.*—As regards the length of present service, before symptoms of dysentery appeared, four replied that they had been in the service one month; eight, two months; seven, two and a half months; forty-five, three months; two, three and a half months; two, four months; one five months; and one, six months. The remainder had longer present service.

It will be noted that the majority of the patients had been in the service about three months before they noted the first symptoms of the disease.

Question 4. *Previous Residence.*—As the question of infection with

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Endameba histolytica prior to the arrival of the patients at El Paso is very important, it was desired to ascertain in what State each individual had resided before coming to the border, and Table 2 gives the result of this inquiry, including the number of patients from each locality.

A study of this table demonstrates the fact that most of the infected soldiers came from States where endamebic dysentery is not regarded as a common disease, and, indeed, where a case is usually considered a medical curiosity. Thus, of the hundred patients, no less than sixty-two came from New England and the Middle West, while five came from the western States of Washington, Oregon, and California. All of these soldiers denied ever having had dysentery or severe diarrhea before entering the service and coming to the border. Seven of the nine patients who had resided in the Philippines before coming to El Paso stated that they had suffered from endamebic dysentery while serving there, and while it cannot be proven, I consider it probable that their present attack was a relapse of an old infection. An interesting fact is, that of the eight cases residing in Texas, five had lived in El Paso before entering the service.

Question 5. Previous Attacks of Diarrhea or Dysentery.—To this question, eighty-nine of the hundred patients answered in the negative, and eleven stated that they had dysentery before coming to El Paso. Of the eleven, nine were regular soldiers who had served in the Philippines, one a militiaman from South Carolina, and one a militiaman from Pennsylvania. Of the eighty-nine soldiers who answered in the negative, all denied that they had ever had diarrhea or dysentery before arrival at El Paso.

As the vast majority of these men (no less than sixty-seven) had resided in States where endamebic dysentery is a very rare disease, as shown in Table 2, there is no reason for doubting the truth of their statements regarding previous attacks of the disease. The infected soldiers in the Massachusetts regiments, twenty in number, all came from Boston, Cambridge, or Worcester; the twelve Michigan patients from Detroit and Ann Arbor; the thirteen Pennsylvania patients from Philadelphia, Harrisburg, Pittsburgh, and smaller cities in that State; the five Ohio patients from Cleveland and Columbus; and the five Rhode Island patients from Providence. It is well known, of course, that in none of these cities is endamebic dysentery a common disease. Therefore, we are justified in concluding that these men were not infected with this disease before reaching their stations on the border.

Question 6. Place and Date of Present Attack.—The following table gives the place where the patients showed the first symptoms of dysen-

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tery and includes 126 cases in which this data could be ascertained with accuracy.

TABLE 3.—*Camps in Which Endamebic Dysentery Occurred, with Number of Infections.*

Name of camp	*No. of cases*
Camp Cotton, El Paso, Tex	32
Fort Bliss, including Camp Bliss	24
Camp Stewart, El Paso, Tex	19
Camp Pershing, El Paso, Tex	14
Camp at El Valle, Mexico	32
Camp at Dublan, Mexico	5

The answers to question 6, regarding the *place* where the men were stationed when they noted the first symptoms of dysentery, show that, of the camps situated in El Paso, Camp Cotton had the greatest number of infections, although fewer troops were stationed there than in the other camps, and Camp Stewart the smallest number, although this camp was occupied by the entire Pennsylvania Division. That Camp Cotton had the greatest number of cases is due, I believe, to greater chances of infection, the camp being situated close to the poorest Mexican quarter of El Paso, a district in which sanitary conditions were very bad at the time the outbreak of endamebic dysentery occurred. The experience of this camp as regards dysentery demonstrates the danger of placing troops in close contact with a native infected population, for it is well known that endamebic dysentery is very prevalent among the lower class of Mexican residents of El Paso, and I am informed by several physicians of the city that severe epidemics of this disease have occurred in this population. As will be noted later, in discussing the importance of flies in the transmission of this form of dysentery, it is probable that much of the infection among the troops at Camp Cotton was due to infected flies from the adjacent Mexican houses and stores.

It will be noted that the Eighth Cavalry had nine cases of endamebic dysentery and, as this regiment had returned from the Philippines in 1915, an inquiry was made as to whether these infections were contracted there or in Fort Bliss or El Paso. It was found that none of the men who developed dysentery in this regiment had suffered from the disease in the Philippines, and that, as a matter of fact, only two of the nine patients had ever served in the islands.

Of the endamebic infections occurring among the soldiers of the Punitive Expedition in Mexico, the troops at the camp at El Valle furnished thirty-two cases, while those camped at Dublan had only five infections at the time this data were collected, although the number of troops camped at Dublan was nearly four times as great as the number

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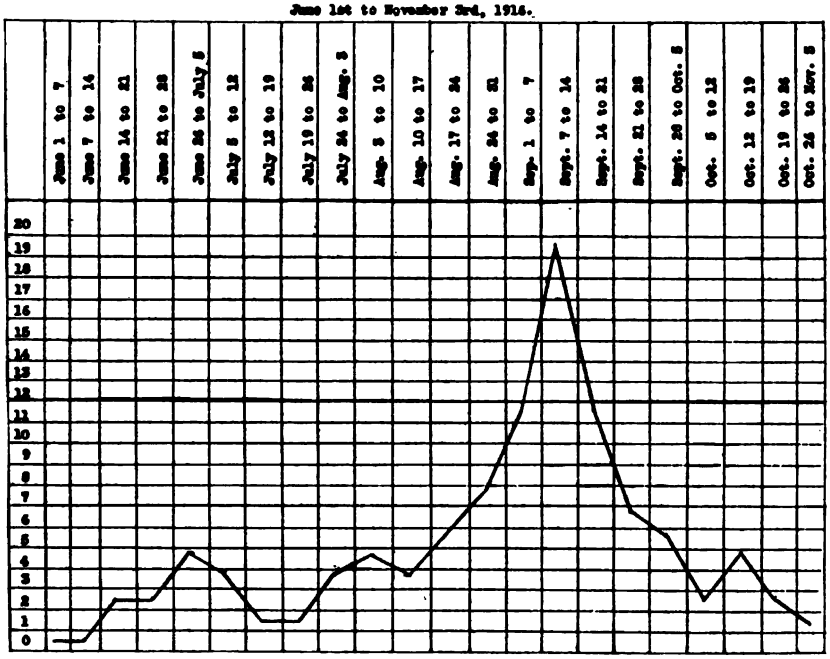
camped at El Valle. The reason for this marked difference in the incidence of the disease in these two camps is not known, but merits investigation.

Date of Appearance of Symptoms.—As regards the date of the appearance of the symptoms of dysentery in the cases occurring in and around El Paso, a study of the attached graphical chart will show that the first two cases occurred between June 14 and 21, although these patients were not admitted to hospital until the latter part of July. Both of these cases were relapses of a previous infection, occurring in soldiers

Chart showing Incidence of Endamœbic Dysentery in Troops at El Paso, in Weekly Periods:-

June 1st to November 3rd, 1916.



of the Regular Army who had served in the Philippines. Between June 21 and August 3, 1916, only nine cases occurred, but beginning with August 3 there was a sharp rise in the number of cases, which reached its height during the week of September 7 to 14, nineteen cases occurring during that week. After this period there was a gradual decline in the weekly rate until October 5; a slight rise during the week of October 12, followed by a fall, and by November 3 the epidemic had practically ceased.

In considering this chart it should be remembered that the dates given are not those of admission of the cases to hospital but the date

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upon which the patients first noticed the symptoms of the disease. Of course, a chart showing the date of admission to hospital would differ considerably from the one given, as in most instances the men did duty for a time after the appearance of symptoms.

From a study of this chart it is evident that between the first of August and the latter part of September some cause operated to greatly increase the incidence of endamebic dysentery among the troops at El Paso and an effort has been made to determine, if possible, to what this increase was due. As will later appear, the only factor that could have operated to produce the increase during the time mentioned was the great increase in flies which began late in July and continued until late in September, as all other conditions were identical both before and during the outbreak of the disease.

Question 7. Time after Arrival at Station Where Dysentery Occurred.—This question was asked with the idea of arriving at an approximate conclusion regarding the period of incubation, or, at least, the time after arrival in an infected locality before symptoms of dysentery developed. The following table gives the period after arrival before symptoms of the disease appeared and the number of cases for each period of time.

TABLE 4.—*Period Elapsing after Arrival before Symptoms of Endamebic Dysentery Appeared*

Period after arrival	No. of cases	Period after arrival	No. of cases
One week	1	Three months	8
Two weeks	8	Fourteen weeks	1
Three weeks	3	Four months	3
One month	24	Eighteen weeks	1
Six weeks	2	Six months	2
Two months	28	Eight months	1
Ten weeks	16	One year	2

While no conclusion of real scientific value can be deduced from this table regarding the exact incubation period of endamebic dysentery, it does show what may be expected regarding the time of the appearance of the disease after troops reach an infected locality where conditions are similar to those that obtained at El Paso during the period of the epidemic. It will be noted that of the hundred cases occurring in the camps at that place in which accurate data could be obtained, thirty-six or 36 per cent occurred during the first month after arrival, and sixty-six or 66 per cent within the first two months, while ninety or 90 per cent occurred during the first three months after reaching the infected locality. These figures are very significant and are especially valuable because

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these troops were practically all militia and had not served in any other locality than their state camps, where endamebic dysentery did not occur, and thus the question of a previous infection could be ruled out without violating the accuracy of the data.

It would, therefore, appear that under the conditions obtaining in the camps in and around El Paso during the period noted, if endamebic dysentery is endemic, about 35 per cent of the infected troops will develop the infection within a month after their arrival, 65 per cent within two months, and 90 per cent within three months after arrival.

We know from clinical observation and experimental research upon both man and animals, that the period of incubation in endamebic dysentery varies greatly, but the fact that so large a proportion of the infections observed here developed within two months after arrival, and that 36 per cent developed within one month, is interesting and valuable, as showing the natural period of incubation under conditions similar to those present in the camps at El Paso.

The most valuable data that we possess upon the exact period of incubation of endamebic dysentery are furnished by the experiments of Walker (*Philippine Journal of Science*, Sec. B, 1913, viii, p. 253) upon prisoners in Bilibid Prison, in Manila. He found that eighteen of twenty men who were fed material containing cysts of *Endameba histolytica* became parasitized, the average time elapsing between the ingestion of the material and the appearance of the endamebae in the stools being practically six days. Of these cases, four developed typical endamebic dysentery, one after 20 days; one after 57 days; one after 87 days; and one after 95 days, the average period of incubation of the disease being 64.8 days. From these experiments one would expect that most infections with this parasite would cause symptoms within three months, if the individual were susceptible, and the fact that 90 per cent of the endamebic dysentery cases occurring at El Paso developed within three months well illustrates this point. However, it is evident that the period of incubation may be much shorter than the experiments quoted would indicate, for no less than eight of our cases developed symptoms at the end of two weeks after reaching El Paso, three in three weeks, and twenty-four within one month. In all of these cases, with the possible exception of one, infection before reaching El Paso could be practically excluded. One case may have suffered from a relapse of an infection contracted in the Philippines six years before, although no symptoms had been noted for over five years. The case developing symptoms one week after arrival was a relapse of an old infection.

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Question 8. *Data Regarding Infection.* (*a*) *Have You Eaten Raw Food in Mexican Resorts?*—To this question all but seven of the infected soldiers replied in the negative. Of the seven who admitted that they had eaten uncooked food in Mexican resorts, three had dysentery in the Philippines and their present attack was probably a relapse.

There is absolutely no evidence that the eating of cooked or uncooked food in Mexican resorts had anything to do with the epidemic of endamebic dysentery, if we can believe the statements of the patients, and there is no reason for doubting these statements. While this disease is quite common among the Mexican residents of El Paso, as I know from personal experience, it is certainly true that the epidemic under discussion did not originate from the eating of food in Mexican houses or resorts, although there is no question that the men would have exposed themselves to infection had they done so.

(*b*) *Exposure of Food to Flies.*—To this question every patient replied in the affirmative and all but eight volunteered the information that these insects were very numerous in their camps. In the general discussion which follows, the relationship of flies to the spread of this epidemic will be considered, but there is no doubt in my mind that these insects were responsible for the great majority of the infections.

(*c*) *Source of Water Used Prior to Infection.*—All but twenty of the 130 infected soldiers from whom this data could be obtained, stated that they had used no water but that from the water supply of the city of El Paso. Three had used water from wells along the border, five water from tank cars supplied from railroad watering stations, while twelve admitted that while on duty in Mexico that had used water from any available source, including irrigation ditches, wells, pools, and running streams.

As regards the soldiers who used water from wells along the border and from various sources in Mexico, the probability of their having become infected from the water cannot be excluded, and, indeed, in the case of the twelve who admitted drinking all kinds of water in Mexico, such a method of infection is more than probable. As regards the five soldiers who, during a practice march, used water from tank cars supplied by the railroad, it is not thought that their infection was contracted from this water for the reason that an entire division used the same water at the same time, and, with the exception of the cases mentioned, no other infections have developed, as would certainly have been the case had this water been infected.

All of the other infected soldiers, 110 in number, used only water supplied by the city of El Paso from the city water works. El Paso has an excellent water supply, the water being obtained from deep

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driven wells, and there has never been any evidence pointing to this supply as the cause of endamebic dysentery in the city.

This water was carried in pipe lines to the camps and delivered from faucets, so that there was no chance of its becoming infected with endamebae after reaching the camp sites.

At the time that the epidemic occurred among the troops there was no increase of the disease in the city population, which would have suffered also had the common water supply been the source of infection. Therefore, all of the evidence available points conclusively to the fact that the water furnished the troops had nothing to do with their endamebic infection and that the epidemic was not water borne.

(*d*) *Have You Been on Detached Service?*—Only eight of the soldiers suffering from endamebic dysentery had been on detached service away from El Paso, with the exception, of course, of the twelve already mentioned, who had served in Mexico.

This question was asked because of the probability that some of the men might have contracted their infection elsewhere than in the camps at El Paso, but it is evident that this factor was not operative to any extent and that the vast majority of the infections were contracted here.

(*e*) *Have You Been in Close Contact with Mexicans?*—To this question all but two of the patients replied in the negative, so that it is evident that "contact infection" with Mexicans played practically no part in the spread of endamebic dysentery among the troops at El Paso.

General Discussion of the Results of the Inquiry.—From the data given in this report it is demonstrated that a definite epidemic of endamebic dysentery occurred among the United States troops stationed at El Paso and in Mexico during the summer and early autumn of 1916. As we have no knowledge of the epidemiology of the disease in the Punitive Expedition we are unable to draw any conclusions regarding its causation, but it is believed that some points of interest and future value to the military service have been ascertained as the result of the study of the epidemic in the camps at El Paso.

The investigation has demonstrated that the vast majority of the men who became infected came from localities where endamebic dysentery is a very rare disease and that previous attacks of dysentery or severe diarrhea could be excluded. Therefore, the conclusion is justified that the infection was contracted in the camps at El Paso or in the city. The data also show that, with the exception of the truck companies, company infection was not a factor in the spread of the disease and thus infection by contact did not occur to any appreciable extent. It is also noticeable that mounted organizations had a relatively larger number of cases than unmounted, that certain camps

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suffered more severely than others, and that the greatest number of cases occurred during the month of September.

It is also evident that the disease was not transmitted by water in the case of the troops infected in the camps at El Paso, as proven by the fact that they used the same water as the population of the city, and that during the occurrence of the epidemic among the troops there was no increase of endamebic dysentery in the civilian population. It is thus evident that some factor favoring infection was operative in the camps that was not operative in the city, and this phase of the subject will now be considered.

Transmission of the Infection.—As is now well known, endamebic dysentery, like typhoid, paratyphoid, bacillary dysentery, and cholera, can only occur by men swallowing the causative agent, as this is the only way in which the endamebae can reach the intestinal tract under natural conditions. Therefore, infection in practically all instances occurs through the ingestion of contaminated food or drink. Theoretically, contamination of these may occur by direct infection through infected hands, in handling the food; by human excrement used as fertilizer; by dust containing cysts of *Endameba histolytica;* by the improper disposal of sewage; and by contamination by flies or other insects which have been in contact with the excreta of the infected.

It is now generally accepted that the cysts of *Endameba histolytica* are the infective agents in the vast majority of instances, and that the probability of infection through the motile forms, or trophozoites, is practically *nil*, owing to the destructive action of the acid gastric juice upon these forms. While it is undoubtedly true that the cysts *are* generally the forms which cause infection, it should not be forgotten that the supposed action of the gastric juice upon the trophozoites is purely an assumption and that there is good evidence that the motile forms may cause infection. In my own experience I have observed infections in man which could not be explained in any other way, and I have produced typical dysentery in kittens by feeding them material containing only motile forms of the parasite, without previously neutralizing the acidity of the stomach contents. However, as the cysts are apparently the usual cause of the infection in man, their resistance to external influences is a question of vital importance to the epidemiologist and sanitarian. Unfortunately, but little is known regarding this subject, but a few facts have been ascertained that explain much that may be observed regarding the spread of an epidemic of endamebic dysentery.

Walker (*loc. cit.*) was successful in infecting man by the ingestion of fecal material containing cysts of *Endameba histolytica* which had

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been kept moist for two days, and with the cysts of *Endameba coli* which had been kept for a period of ten days. He also found that, of sixteen men who ingested encysted *Endameba histolytica* without neutralizing the stomach contents, all became infected, thus proving that the acidity of the gastric juice is not injurious to the cysts. Indeed, Walker thinks that the acid of the gastric juice may dissolve the cyst wall and thus favor infection, but if this theory be correct, it is difficult to understand why infection with the motile forms, or trophozoites, should not readily occur, for if the cyst wall is dissolved by the gastric juice the young trophozoites must also be exposed to any harmful action of the acid gastric contents.

Thompson and Thompson (Thompson, D., and Thompson, J. G., *Journal Royal Army Medical Corps*, 1916, xxvii, p. 1) found that the cysts of *Endameba histolytica* remained unchanged in water for a period of twenty-five days and that in solid stools they remained unchanged for a month in portions of the stool which retained some moisture. When exposed to sunlight the cysts dried and shriveled up and the authors conclude from this that the transmission of endamebic dysentery through dust is very exceptional, if it occurs at all.

One of the most significant and valuable results of the work of these investigators is the demonstration of the fact that the cysts of *Endameba histolytica* may be demonstrated in an unchanged condition in the intestine and excreta of flies as long as eighteen hours after these insects have been fed upon material containing them. It is thus evident that the danger of the transmission of this disease by flies lies not only in the direct contamination of food and drink by the feet of the insect but also through their droppings, and that the fly may remain infective for a long period after ingesting infected material.

From the facts just given it is evident that the cysts of *Endameba histolytica* have a considerable power of resistance to external influences provided the feces containing them are kept moist, and certain deductions may be drawn from these facts concerning the method of transmission of endamebic dysentery among the troops at El Paso.

In the first place, it may be stated without hesitancy, that the contamination of food or drink by infected dust, as claimed by some, was not a factor in the transmission of the disease at this place. As shown by Thompson and Thompson, the cysts of *Endameba histolytica* are quickly destroyed when exposed to drying by direct sunlight, and it is impossible to believe that they could exist for any length of time in the sands of the border during the intensely bright and hot days of August and September. In addition, if contamination of food or drink by dust had been the cause of the epidemic, the civilian population would

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have suffered severely, which was not the case, and the infection would have been as prevalent in one camp as another, for dust and sand storms were equally prevalent in all of the camps.

It is also certain that there is no evidence that *direct contact* of the infected with the healthy played any part in the spread of the disease. In no instance was it found that either a "carrier" or a patient suffering from the disease was employed in a kitchen or mess room or had anything to do with the handling of food or drink.

The question of the transmission of the disease by an infected water supply or by raw food contaminated with human excrement used for fertilizing purposes can likewise be answered in the negative, for it has already been shown that neither of these factors was operative during this epidemic.

If we consider carefully the data accumulated in the study of this outbreak of endamebic dysentery, the only conclusion possible, regarding its transmission, is that it was carried by flies. This conclusion is justified for the following reasons:

1. The number of cases of dysentery increased with the increase in the number of flies in the camps and new infections ceased with the disappearance of the flies.

2. The greatest number of cases occurred in camps where the flies were most numerous.

3. Conditions regarding temperature, water and food supply, winds and dust, and disposal of excreta were the same before, during, and after the epidemic. The only factor that differed was the number of flies present in the camps.

4. Contaminated water, eating of raw food in Mexican resorts, contamination of food or drink by infected dust, and direct infection by contact, have all been excluded as methods of transmission in this particular epidemic.

5. The distribution of the cases in organizations speaks strongly in favor of fly transmission, being "spotty" instead of general, as would be the case had an infected water supply been the source of infection.

Transmission by Flies.—Regarding the relation of this epidemic of endamebic dysentery to flies, it may be stated that, despite the most careful sanitary supervision, these insects began to be numerous in the camps at El Paso during the last week of July and gradually increased in number, until by the first of September they were a veritable pest. During this time there were no screened mess tents in most of the camps, and, as shown by the unanimous testimony of the infected already quoted, the food was continually exposed to contamination by infected flies. Disposal of excreta was in latrines, none of which were fly-proof and some of which, from personal observation, were

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poorly cared for despite the utmost exertions of sanitary inspectors and the medical personnel.

The presence of both true "carriers" and "convalescent carriers" of *Endameba histolytica* was demonstrated in some of the organizations and undoubtedly occurred in all, so that the infection of the fly can be easily explained, and if we consider the organizations having the greatest number of cases there is still more reason for believing that the fly was responsible for the spread of the epidemic. Thus, mounted organizations had a greater number of cases than unmounted and flies were more numerous in their camps owing to the proximity of horses. The only exceptions to this rule were the Thirty-first and Thirty-second Michigan Infantry, and in both of these instances special conditions were present accounting for the number of infections. These organizations were camped in a section of the city in close proximity to a low class Mexican population, and their mess tents and kitchens were continually exposed to the flies from this portion of the city, many of which must have been infected, as endamebic dysentery is common in this population.

The case of the truck companies also furnishes an exception to the rule that mounted organizations had more cases than unmounted, but, aside from the nature of their duties which carried them all over the infected territory, there was a mule corral, owned by a civilian, very near their camp which furnished swarms of flies, as I was informed by their surgeon. As already noted, there were several "carriers" discovered in the truck companies which were infected, and these undoubtedly caused the infection of the flies.

I have already considered the subject of water supply, contact infection, and possible infection by dust, and have shown that none of these factors caused the transmission of the disease. In fact, as already stated, there was no condition present during the epidemic that was not present both before and after, with the single exception of the rise and fall in the number of flies, which was practically coincident with the rise and fall of the epidemic.

Upon reference to the graphical chart it will be noted that the cases of dysentery began to increase considerably during the latter part of August and reached their height about the middle of September, while, as has been stated, flies became numerous during the latter part of July, were most numerous during August and the first part of September, and gradually disappeared during October and November.

Allowing from a month to two months for the period of incubation of the disease, as shown by Table 4, we have the height of the epidemic curve, which occurred between September 7 and 14, exactly where we

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would expect it to be were flies the chief agents in the transmission of the disease. This fact, taken in conjunction with the fact that with the disappearance of flies endamebic dysentery also disappeared, is, in my opinion, absolute proof that these insects were the agents of transmission of the disease in this epidemic. It may be stated that from December 1 until January 8, the date of writing, not a single new case of endamebic dysentery has originated in the camps at El Paso, so far as our records show, and that during this time flies have been practically absent or in such small numbers as to be below an infectious minimum.

That a much greater number of cases of endamebic dysentery did not develop under the conditions that prevailed in the camps during the fly season was undoubtedly due to the vigilance of the sanitary inspectors; the prompt hospitilization of cases as soon as discovered; and the careful and thorough treatment that they received at Base Hospital No. 2.

(*To be continued.*)

CONSOLIDATED WEEKLY REPORTS OF SICK AND INJURED, SOUTHERN DEPARTMENT, U.S. ARMY.

1917 for week ending	Troops	Mean strength No.	Per cent of sickness	Per cent of sickness last report	Dead		Transferred No.	Actual No. of cases						
					Disease No.	Injury No.		Diarrhea	Dysentery	Malaria	Variola	Typhoid	Paratyphoid	All other diseases
January 27.....	Regular	47,758	3.39	3.53	5	1	317	1	12	11	..	2	..	2,343
	Militia	82,174	3.22	3.47	7	2	580	7	14	33	..	1	5	4,838
February 3.....	Regular	47,758	3.58	3.39	4	....	260	1	12	7	..	3	..	2,340
	Militia	82,174	2.75	3.22	5	1	660	8	13	22	..	1	5	4,458
February 10....	Regular	47,758	3.20	3.58	10	3	215	7	10	3	1	3	..	2,486
	Militia	68,944	3.45	2.75	12	3	581	5	11	14	..	1	3	4,059
February 17....	Regular	47,758	3.42	3.20	7	1	259	...	7	1	1	2	..	2,457[1]
	Militia	68,944	3.23	3.45	3	1	711	...	10	12	..	1	..	4,011[2]

[1] Including seventy-two cases of pneumonia (Regular), of which fourteen died.
[2] Including 131 cases of pneumonia (Militia), of which twelve died.

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DEMOGRAPHY IN SO FAR AS IT RELATES TO THE VITAL STATISTICS OF ARMIES

By Lieutenant Colonel WESTON P. CHAMBERLAIN
Medical Corps, U. S. Army

(Concluded)

Variations for the Caucasian Race

Turning from the great ethnic divisions of mankind, the Caucasian, the Ethiopian and the Malayic, brief consideration will be given to the different racial groups of the Caucasian branch. Here the differences are likely to be much less clearly marked than those previously considered. An accurate comparison between the rates shown in our own military service and the corresponding figures in foreign armies is impossible because the conditions under which the sick are treated and the records prepared in the different countries are so diverse. Also the circumstances of service, housing, food, enlistment and discharge are dissimilar. If the physically unfit are promptly and thoroughly discharged from the service on surgeon's certificate of disability the result will be a lowering in the admissions, the constantly non-effective and the deaths, with of course a rise in the corresponding rates for the civil population. The thoroughness with which elimination of the defectives is carried out varies in different armies. Notably in our own service soldiers with tuberculosis, instead of being discharged, are kept under treatment in the special sanatorium provided for that purpose. In any army the number of discharges, and also the deaths, will vary materially with the care exercised in the selection of recruits. The total loss, that is a combination of the deaths and discharges for disability, is, therefore, a much more reliable basis of comparison for the health conditions of armies than is the admission or constantly non-effective rate. The total losses of various armies in 1897 varied to the following degree—Austria, 41.5; Italy, 25.4; Great Britain (home stations) 23.29; United States, 14.72; Belgium, 14.4; Germany, 11.6 (1895). The figures for deaths from disease and for discharge for disability are shown in Table XVIII. In the report of the Surgeon General for 1913, it is stated that the figures for the preceding year, as well as for many previous years, show that men are discharged much more freely in foreign armies than in our own. In the Surgeon General's comparison made that year the death reate for the United States Army was higher than for any other except the Spanish. It was more than double that of the Dutch and Prussian armies. This condition is attributed to the fact that in other armies the disabled are more promptly eliminated by discharge.

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A certain amount of data has been gathered from our own Army statistics for United States soldiers of foreign extraction. As presented by Munson for the period 1890–1896, the total losses were somewhat less for native-born Americans than for any born abroad except the English, Scotch and Swiss. The differences, however, were generally small. Admissions were greater for native-born than for any others except French, and the constantly non-effective rate was higher than for any except French and Canadians.

As regards alcoholism nationality appears to exercise a marked influence. For the years 1890 to 1896, the admission rates were 12.59 for Danes, 28.51 for American-born, 26.62 for German, 51.48 for English and 90.96 for Irish.

Venereal disease had a higher incident among men born in the United States and Canada than among others, the maximum of 93.08 for native-born contrasting with 47.66 for Swiss and 50.96 for Irish. Other nationalities gave intermediate figures.

TABLE XVIII.—*Deaths from Disease Only and Discharge for Disability for All Causes per* 1,000 *of Mean Strength in Various Armies.*

Army	1907		1908		1909		1910		1911		1912	
	Dth.	Dis.	Dth.	Dis.	Dth.	Dis.	Dth.	Dis.	Dth.	Dis.	Dth.	Dis.
United States	3.2	25.4	3.1	21.4	3.0	18.9	2.3	15.3	2.8	15.0	2.3	14.5
Prussia	1.2	44.3	....	....	1.1	41.1	1.0	40.1	1.2	42.3	....	....
Great Britain	....	11.7	1.8	12.5	2.3	10.5	1.9	11.1	1.9	9.8	1.9	9.4
Russia	3.5	43.9	3.3	40.5	3.5	41.7	3.6	33.0	....	....	....	....
Austro-Hungary	2.2	....	....	....	2.2	....	1.8	33.0	2.1	....	....	....
France	3.4	40.5	....	....	3.3	35.3	2.5	40.7	....	....	....	....
Spain	4.2	36.2	3.6	40.2	3.3	44.2	4.5	33.5	....	....	....	....
Japan	3.8	34.9	....	....	2.9	26.9	....	....	....	....	....	....

The high admission rate of 5.70 and 4.76 for tuberculosis among French and Scotch respectively are in striking contrast with 1.42 and 1.49 for English and German-born. Native-born Americans showed an intermediate rate of 3.33.

Diabetes is generally considered to be peculiarly frequent in the Hebrew race and comparatively rare among negroes, but as a factor in the health of armies it is of small moment.

Acclimatization of Soldiers

Among the many factors that have been considered to have a bearing on acclimatization none has received more consideration in the past than that of racial idiosyncrasy. That the negroes transplanted to cool or cold climates suffer more than white men from tuberculosis, pneu-

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monia, and frost bite has been shown above, and seems to hold true, though in varying degree, irrespective of whether the negroes were raised in the tropics or in the temperate regions of North America. For service in very cold countries like Alaska, it is generally considered that Latin races and Hebrews do not resist the cold as well as residents of northern Europe, especially the Swedes, Norwegians and Irish. As regards the infectious pulmonary diseases, like tuberculosis and pneumonia, it is difficult to determine in what degree the relative susceptibility of negroes is due to purely racial lack of resistance, and how much is the result of poor ventilation and overheating brought about by a desire to avoid the unusual and uncomfortable sensation of coldness.

As regards acclimatization to the tropics it may be said that the subject is at present in a transition stage, since it is becoming more generally recognized that *most* of the illness and deterioration among Caucasian residents, formerly attributed directly to the climate of hot countries, is in reality due to infection with various parasites, which either flourish chiefly in low latitudes or else are dependent for their dissemination upon intermediate hosts that are active only in warm weather. All of the diseases produced by these parasites belong to the class designated as preventable, and can be largely avoided by careful attention to the details of tropical hygiene. We may live to see the day when acclimatization will be merely a question of enforcing sanitation. African and Asiatic races have in the past been considered to possess a relative immunity to many tropical diseases; also Eurasians and Eurafrics as a result of the admixture of presumably immune blood. That natives of malarious regions in the tropics acquire a certain immunity to the more common *effects* of malarial toxin has been stated above, but that the admission rates for Filipinos and Porto Ricans from that source alone is very high appears equally clear. The malarial rate is very low for American negroes serving in the Philippines, and since malaria is such an important factor in the health of armies in the tropics one might argue that the negro soldiers from America would make an ideal garrison for the tropics. Low rates for typhoid, for insolation, and for alcoholism might seem still further to support this conclusion. When, however, one compares the relative *total* morbidity and mortality as shown in Table III, it is at once evident that the constantly non-effective and discharge rates average practically the same for the two races, while the admissions and deaths are much higher for negroes than for whites serving side by side in the Philippines.

Of the Aryan branch the Semitic peoples are said to surpass others in their adaptability to tropical conditions. Among European nations the Latin races have been considered to be better suited for residence

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in low latitudes than are the more northern peoples, and the Spaniards, with their admixture of Moorish blood, have been particularly pointed out as comparatively successful colonizers. It has often been stated that the English stock in India does not continue to thrive generation after generation, but it must be remembered that our present satisfactory knowledge of tropical preventive medicine does not date back even one generation. In tropical Australia, where there is practically no native population to complicate the sanitary problem, the experience of the next one or two generations will be most instructive. It is interesting to note, as one possible indication of a change wrought by climate alone, that among school children, most of whom had grown up in Australia, Breinl found a marked shift to the left in the Arneth blood picture (13). At an earlier date I had found the same change in equal degree among Filipinos, and in a much less degree among white men after a short residence in the tropics.

It has been recommended that men of medium stature, spare frame, dark hair and complexion be selected for tropical service, the type approaching that of the Southern European. Woodruff particularly has claimed that the large individuals with fair hair and complexion, corresponding to the type of men seen in northwestern Europe, are unsuited for very sunny regions and for the tropics. A comparative study of this subject which I conducted in 1910–1912 showed that the blondes were fully as able as the brunettes to withstand Philippine service for a period of two years, and probably for a period of five or six years (14). Beyond that length of time my observations did not extend. It is in regard to the nervous system especially that blondes are supposed to suffer (16). In this connection Table X is of interest, showing that for nervous diseases as a whole there was a slightly greater rate among white men serving in the tropics than among those at home while there was a larger percentage of increase among negroes under like conditions. For insanity, however, the reverse was true. It must be remembered that while serving in the Philippines there are many other factors other than climate which will readily account for the slight increase in nervous diseases and insanity. Among these are nostalgia, isolation, lack of recreation, scarcity of white women, and indulgence in native liquors of poor quality.

As regards the statement that small spare men are better suited for tropical service the following observations made by me while conducting the blonde-brunette test are of some interest. During a period of one year a group of nearly 1,200 soldiers, who were under observation, lost an average of approximately 2 pounds in weight per man. The data regarding these men were arranged into sub-groups according to size of

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the individuals and it was found that the percentage of weight lost was not affected by size. If there were in truth a difference as regards size in the ability of the individual to withstand tropical residence, it is probable that the larger man would have shown a greater percentage of loss in weight (17).

There is one remaining point I wish to mention regarding the influence of race on resistance to tropical conditions. Aron in Manila found that when the naked skins of white and brown men were exposed to the sun the surface temperature of the dark skin at the outset rose more rapidly, as was to be expected (15). Consequently the point where sweat secretion began was reached more quickly, and with the evaporation of the exuded perspiration the skin was cooled. Also when the white man was perspiring profusely and sweat was dropping from him (thereby being wasted as far as cooling by evaporation is concerned), the brown man showed only a velvet-like layer of fine droplets, just the condition most favorable to evaporation and consequent lowering of skin temperature. Anatomical studies of the skin apparently showed that dark races possessed a larger number of sweat glands to a given area than did white men. The heat-regulating apparatus of the brown man thus appeared to be not only more complete, but also more sensitive, and to operate more promptly and successfully than that of the white man under similar conditions. Aron also found that monkeys (which are very poorly supplied with sweat glands) died of hyperpyrexia in an hour when exposed to the sun in Manila, but suffered no ill effects if, while undergoing much longer exposure, the blast of an electric fan was directed on them, thereby favoring evaporation. These experiments with monkeys tend to prove that the ill effects of excessive exposure to the tropical sun are due to the heat rays rather than to the actinic or ultra-violet rays. If the above observations regarding the better heat regulating apparatus of dark-skinned races should be confirmed they would seem to demonstrate a true racial superiority in resisting the effects of direct sunlight. However, such disadvantage in this respect as the white man labors under can apparently be balanced by the use of proper clothing and reasonable care, as is shown by the fact that the body temperature of the acclimated white man in the tropics is the same as that of the native, and differs little if any from the accepted standards for temperate regions.

Summary of More Important Racial Differences

Admissions for disease lower for negroes than for whites in United States. Reverse was the case in the Philippines. Admissions for Filipinos much lower than for negroes or whites.

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Discharge for disability and constantly non-effective rates slightly lower for negroes than for whites both in United States and in Philippines. Discharges about the same for Filipinos as for whites, but constantly non-effective rate much lower.

Death rate very much higher for colored than for white troops, both at home and abroad. This agrees with experience in civil life. Death rates for Filipinos intermediate for the whole decade, but have been reduced 50 per cent since beriberi was eradicated in 1910, and are now about the same as for whites.

Circulatory diseases of all kinds slightly more common among negroes than among whites both at home and abroad during last decade. Chronic heart disease and chronic nephritis was much more common among negroes. Same conditions in civil life. For Filipinos rates for all these diseases were much lower than for whites. Same difference, but more marked, between English and Indians.

Digestive diseases more common among whites at home and among negroes in the Philippines.

Admissions for both acute and chronic rheumatism very much higher for negroes than for whites both at home and abroad. Filipinos have lower rates than whites.

During the last decade nervous diseases were a little more frequent among colored men both at home and abroad. Insanity rate about the same for both races. For Filipinos rates for nervous diseases and insanity very low.

From 1878 to 1897 respiratory diseases more common among negroes while in 1905–1914 the reverse was true in the United States, but not in the Philippines. Rates for Filipinos were higher than for whites. Both at home and abroad incidence of tuberculosis and pneumonia is very much greater among negroes than among whites. Filipino rates are intermediate.

Venereal disease more common among negroes than whites, the difference being specially marked in the Philippines. Syphilis formerly more common among negroes, but in last decade rates higher for whites. High rate for Porto Rican Regiment. Rate for venereal disease among Filipinos one-fifth that for whites in Philippines.

Typhoid fever much more prevalent among white soldiers than among negroes or Filipinos. Mortality higher for negroes.

Malaria is much more common among Filipino troops than among white in the Philippines. Rate for Porto Ricans high. Both at home and abroad malaria three times as prevalent among whites as among negroes.

The incidence of beriberi a question not of race but of diet. Negroes

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not immune to yellow fever and death rate about the same as among whites.

White troops in last decade had three times as many admissions for alcoholism as negroes, and fifty times as many as Filipinos. Porto Rican rate about the same as for white Americans. In period 1887–1896 negro rate only one-eighth of white rate.

Frost bite about five times as common among negroes as among whites. Sunstroke about twice as frequent among white as among negroes.

Mortality for plague three or four times as high for Orientals as for Europeans. Mortality for smallpox much higher for negroes than for white men.

Among different branches of Caucasian race the differences are relatively small and difficult to establish. Most notable were alcoholism, which varied from twelve per thousand for Danes to ninety-one for Irish, and venereal disease from forty-seven for Swiss to ninety-four for native-born Americans.

Increased knowledge may show acclimatization in the tropics to be merely a question of proper sanitation.

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EDITORIAL

FIELD SANITATION OF THE FUTURE

Border service has resulted in the recent aggregation of many thousands of troops under canvas, in tented camps of the conventional character provided with regulation comforts and conveniences. Troops living therein have been kept healthy by the application of special sanitary measures and apparatus, which have been demonstrated by practical experience to best meet the peculiar needs of such tent-camp environment. In other words, the immediate environment of camp life has been officially standardized; and with this has come standardization of the measures necessary to remove or minimize the dangers to health otherwise pertaining to camp life itself. Such standardized sanitary arrangements are quite satisfactory and effective so long as there is no change of camp environment on which they depend, as controlled by present regulations. But such change is imminent. It will be brought about for this country in the next war, just as it has already been accomplished in the European war over large areas of military activity. And it will be brought about chiefly by aviation, but to some extent by trench service.

It is apparent to even the casual observer that such great camps as have been maintained along the Mexican border could not have existed in the presence of an aggressive enemy possessing even temporary, or occasional, mastery of the air. Occupying—as these camps have—areas of perhaps hundreds of acres, they would not only present a constant invitation to bombing from aircraft, which an energetic foe would not be long in accepting, but afford a tempting target too large for aviators to miss. The size of camps for any considerable military forces, makes necessary their establishment in the open and renders concealment impossible; also along the border there are neither trees nor other vegetation to aid in concealment. Tents are habitations for soldiers, and hence are to be destroyed wherever practicable. Also their number gives a reasonable index of the strength of the command they shelter. There is no question, therefore, but that tent camps, within striking distance of the enemy, would be sought out and harassed by hostile aviators, and could maintain only a precarious existence, if any. With increase in the flying radius of air machines, even a distance of a hundred miles or more is no barrier against bomb raids. Nothing but an elaborate system of anti-air craft defense, which it would often not be practicable to install, would suffice to protect these camps.

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One is forced to the conclusion that, except in the remote interior far from the hostile front, such precise, rectilinear tent camps as have been established along the border, could not remain in existence in modern war.

But the doing away with camps of the present character will necessarily alter more or less the standard environment on which our methods of modern field sanitation rest. Principles of sanitation are always the same, but methods of application depend on environment. Hence, as a corollary, there must at once follow corresponding changes in sanitary methods, based on the new conditions created and variable with circumstances. Where a country is well populated, existing structures of an apparently non-military nature will have to be taken over as shelter for troops and for their concealment from aviation observation by day. Where the population is scanty and there are no buildings so to serve, the bivouacking of troops in forests or the construction of underground habitations will have to meet the situation. Where troops are in deadlock in trenches, bomb proofs—dark, undrained and unventilated—protected against shell fire, must serve. The sanitary facilities and problems confronting medical officers in the future will thus range all the way from those of the best civilian communities, possibly with special adaptation to military use, to those of the primitive life at all seasons, of the bivouac, trench and bombproof.

Much of our present sanitary method, based on recent border experience, will therefore, in the next war, fall into disuse. Sanitary problems of character now untried and unfamiliar will have to be met and solved. The sanitary personnel having to do with them can do no better than carefully study the lessons of the war abroad relating thereto and apply them to conditions in this country. If it estimates the diverse situations that may arise, determines in advance the problems it will have to meet, and works out in theory the solutions appropriate thereto, it will be ready with the proper application when suddenly confronted in fact with the new sanitary problems dependent on trench and aviation warfare. Effective measures for sheltering troops, for their feeding and supplying with water; the disposal of excreta, garbage and refuse, together with other sanitary matters, will have to be worked out and laid down in advance. Here is opportunity for further sanitary preparedness, in anticipation of a need now nonexistent so far as this country is concerned, yet certain to arise should war with any important military power come.

E. L. M.

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MEDICO-MILITARY MATÉRIEL

Peter, an English gardener, depicted in "The Worn Doorstep," refused to believe that his country was at war until, during a sojourn at a neighboring little seaport, he found the remains of various women and children scattered over the landscape, as the result of a visit from the enemy's ships. His wife remarked, "Some minds need shot and shell to open 'em." So possibly it may be with us under like conditions.

But no matter what the future has in store, surely the intelligent part of the community cannot ignore the lessons of our recent war with Spain, all of which most of us saw and part of which many of us were.

Need we recall that at the beginning of 1898 the mobile United States Army numbered 20,000 officers and men, equal to any anywhere. This single tactical division was perfectly equipped in all departments, including the sanitary department, for current and prospective demands; but beyond this there was not even a tentpin, nor was there possibility of getting more for many months. Military matériel is largely special, is not obtainable in the market, and must be made to order after patterns requiring special machinery.

Then came war and the successive calls for 250,000 volunteers. The men were gathered quickly, but the matériel not for months and some of it not at all.

The result was inevitable; the 250,000 willing citizens who volunteered in defense of their country, had little or nothing of the material essentials requisite to their well-being or efficiency as soldiers. What wonder that a considerable percentage of them died from unnecessary causes, due to neglect. Neglect by whom? *Their own countrymen, unequivocally and unquestionably.* Year after year and year after year had the War Department vainly urged the necessity for accumulating a reserve stock for just such a contingency, but Congress always turned a deaf ear and the people acquiesced.

Again the war clouds are rolling over us; Congress has authorized, and the War Department is as rapidly as possible increasing the strength of the permanent force to approximately 200,000. For this number, double what we have heretofore had, the matériel now on hand is adequate, but not enough for any more.

That we have this much, and we are now writing of the Sanitary Department, is only through insistence of its officers and the backing of the medical profession; notwithstanding the Dodge Commission recommended that there be always available "a year's supply for an army of at least four times the actual strength, of all such medicines, hospital

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furniture and stores as are not materially damaged by keeping, to be kept constantly on hand in the medical supply depots."

The General Staff has announced that, besides the 200,000 above mentioned, in the event of war we would require the organized militia, 250,000, and, in addition, 500,000 volunteers.

To meet the medical requirements of the 750,000 there is now practically nothing and, were the money available, it would take nearly a year to obtain the matériel, which would cost about $10 per man.

So it is, we are relatively exactly where we were nineteen years ago, with just enough for the Regular Army and nothing more.

It is only fair to assume that the Surgeon General has presented these facts to the proper authorities. But to ask is one thing and to get is another.

Again we are in a situation identical to that in 1898 and again we are facing the same results that followed that situation.

If, in the event of war, the people wish their husbands, sons and brothers to die as they then did, from preventable causes, the Surgeon General of the Army is powerless to deny them. But THE MILITARY SURGEON trusts that when the time of sacrifice comes, they themselves will assume the responsibility and not place it upon the shoulders of an officer who devotedly has sought, by every proper means, to prevent a repetition of the insanitary experiences of the Spanish-American War.

SURVIVAL OF THE FITTEST

Society is organized upon the basis of reward and punishment and, as individualism is rampant, the fashion of the day is to ask what there may be in it for us, rather than *pro bono publico*. But Nature, who will not be denied, steps in and answers, "I am for the race, there is nothing for the unfit, none but the fit shall survive; the race must progress towards perfection or else it will perish off the earth; let the unfit disappear and only the fit remain." Then the spirit of Humanity cries: "Nay! We will make all fit"; so the better man goes down into the ruck to bear his own legitimate burden and share that of the weakling, that the work of the world may go on.

Yet there must be leaders, so from the midst of the ruck appear the fittest. Fittest by nature, attainment or opportunity, all tinctured with that indescribable something called "luck." The mere fact that they appear is undeniable evidence of their fitness to lead in the march of progress. To be sure some are chosen to illustrate the wrong way, so the rest may learn by example what and where are the pitfalls in the march, but fit they are for their purpose, nevertheless.

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Thus, in spite of Humanity and the demands of mediocrity, Nature prevails and the fit are selected.

In the services, in time of peace, the differentiation for advancement of those who are already selected men, presumably fit in all respects and necessarily much above the average, is no easy matter. Yet not to select is to place a premium on mediocrity, high as such may be. There are not so many of us who are urged by the irresistible desire of accomplishment, the ambition to do something that needs doing and to see it done for the sake of the doing, at any cost of effort or personal sacrifice, that they become generally recognized as true leaders, indeed such are so rare they are usually regarded as "cranks" rather than leaders; while on the other hand, but very few of us fail to do our duty as we see it and the country demands, though we may not be seeking new heights to surmount. Who, then, shall be selected? In peace there are always potential Hindenbergs forever lost to view. We are now at peace and, from among so many who are good, the selection depends largely upon a "divinity which shapes our ends." Better this than an endless procession of mediocrity. In war it may be different. Time will tell.

SOMETHING FOR NOTHING

To the student of psychology of the masses, the movement of thought in our country during the last several years, regarding national defense, presents most interesting phenomena. For thirty-three years, a generation, after our civil conflict the people both North and South sought to eliminate war by abolishing all thought of, or preparation for, possible future wars and emphasizing the unhappy experiences in one past war, a family fight—every minutest detail of which is published in a thousand volumes. The happenings in our wars with a foreign enemy, which did not redound to our credit, were concealed from the people and history falsified, perhaps inadvertently because the facts were not easily available. Then too, after all, "we were victorious; besides, this is ancient history and what matter the facts."

Then came the Spanish-American affair, the story of which in all its phases, is available to any who will take the trouble to read it. The result was stupendous. We liberated two nations from thraldom and made our quondam enemy, ancient, honorable, but no longer powerful, a better and more prosperous people in consequence. What we gained was the suppression of a nuisance in our neighborhood, chiefly threatening the health of the people. Nay more, for all inadvertently we suddenly became a world power.

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As an intelligent race we could not fail to appreciate that notwithstanding the successful result of that affair, its means of accomplishment were both inefficient, very costly and, as a military demonstration, beneath the contempt of an efficient enemy.

With the facts before the country for eighteen years, those of us who appreciate their significance have striven to impress upon the indifferent or inimical majority what of danger to the Republic they indicate and what we might do to avert it.

Perhaps through contact we as a nation had become infected with the *bacillus imparatus*, so long epidemic with our British cousins, one of the symptoms of which affection is an obsession, manifested even in otherwise very intelligent sufferers, against insurance of the national safety, or even admission of the possibility of its necessity—an obsession which is jeopardizing the national existence of that great people.

Now that a few are convalescing and reason seems to be returning to enough of us, we are beginning to realize and to impress upon the still infected that our national safety is threatened, that the foolish panaceas that have been prescribed are foolish indeed, an effort to get something for nothing, and that there is but one prophylactic, "one for all and all for one," universal service.

Why should there be any question about the desirability of this course? The Union was founded on the recognized necessity of mutual protection and, for over a century, every able-bodied citizen between the ages of 18 and 45 years was not only required to enroll and serve, but to have his arms and ammunition always ready; moreover, he had to turn out for drill, inspection and target practice. Then came the era of panaceas—necessary, perhaps. The old law had been neglected, its provisions were disobeyed, so, like everything else unused, it was spurned, even though good in principle, and the suggestion of "something for nothing" took its place; with the logical result—nothing.

To return to the patient, our nation; the case is in desperate straits now, possibly the very existence of the sufferer hangs upon the treatment prescribed and carried out at once; there is no time for panaceas and perhaps even the recognized remedies will not avail, but that is not a reason why they should not be used, and used immediately. "Something for nothing" is not the proper remedy, is not obtainable, nor is it worth obtaining. "Service and service only" will avail and is worth while.

God grant that the verdict "*mene, mene, tekel, upharsin*" has not yet been pronounced on us.

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THE WELLCOME PRIZES, 1917

After careful consideration of the various subjects for the Wellcome Prizes 1917, submitted by our members, a committee appointed by the Council reported several as pertinent, from which the Council, after discussion, determined upon the following: The First Wellcome Prize: "Prisoners of War: Organization, Construction and Administration of Prison Camps with reference to the maintenance of the health of prisoners of war and the protection of the health of the surrounding communities." The Second Wellcome Prize: "Sick and Injured Soldiers and Sailors; their distribution, care and disposition outside the military zones, in time of war."

The Council concluded that these subjects were timely and that an elucidation of them would be instructive to our members and of value to the country.

The magnitude and importance of the themes need not be dwelt upon, in view of the situation in Europe today; nor need we assume that their details have been worked out and that any well-considered plan is settled upon in our country in regard to either of them. Moreover, they are equally civic as medico-military in their relationship to the whole community, for while the administration necessarily must be military, even this would be largely participated in by civil instrumentalities. Here it is that the Red Cross, the legally designated representative of civilian activities in war, finds its most important fields of operations.

If these fields are to be successfully cultivated, such will only follow thoughtfully considered and predetermined plans of far-reaching breadth, which the Council hopes to facilitate through the medium of the Wellcome Prizes.

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COMMENT AND CRITICISM

THE WELLCOME FIRST PRIZE ESSAY, 1916

Captain Ashford's admirable essay on the most practicable plan for the organization, training and utilization of the medical officers of the Reserve of the Army and Navy, in which he handles the subject so thoroughly and skillfully, demands only commendation at our hands.

Yet there is another point of view, that of the civilian who is willing to sacrifice much for our country and whose interests, as well as those of the Government, should be carefully considered if the best results are to follow.

The writer of this comment has sought to discuss the subject from the standpoint of a civilian physician and medical teacher, who has been deeply impressed with its importance, in the hope of a still further elucidation of this pressing question; not so much with the expectation of contributing anything original, or of permanent value, but that all phases of it may be given consideration so that practical and lasting results may follow the attempt to organize the medical profession for national defense.

This subject must obviously be discussed under two heads, the Reserve Corps of the Army and that of the Navy. In view of the fact that the Medical Reserve Corps, U.S. Army, will cease to exist after June 3, 1917, and will be superseded by the Officers' Reserve Corps, Medical Section, it would seem advisable to devote our attention almost entirely to the latter, since confusion would be caused by an attempt to suggest a plan of training for an organization soon to be abolished. The points of difference between the two corps are briefly stated in the circular issued by the Surgeon General's Office, September 30, 1916, viz:

(*a*) There is a change in name without change in relation to this office.

(*b*) Commissions are issued for a period of five years and in the grades of first lieutenant, captain and major.

(*c*) Up to the limit of appropriation for this purpose attendance at camps of instruction will be required for a period of fifteen days in each year, the Government paying transportation and subsistence to and from camp and subsistence while in camp.

(*d*) Officers of the medical section of the Officer's Reserve Corps are expected to complete the correspondence course conducted by the Field Service and Correspondence School for Medical Officers at Fort Leavenworth, Kansas.

(*e*) In time of peace no officer above the grade of first lieutenant can be ordered into active duty.

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(*f*) The holding of two commissions, that is, a commission in the medical section of the Officers' Reserve Corps and in the National Guard, will not be permitted.

(*g*) No officer can be called into active service in a grade below that in which he is commissioned, except with his consent."

According to this circular obligatory training is required of junior officers—in camp and in the correspondence course. A second circular, issued November 1, 1916, explaining some points which were not generally understood, emphasizes the fact that practical training is *not* required of the older officers, though participation in the correspondence course is regarded as "highly desirable," but "not compulsory."

Paragraph (*c*) is modified by substituting the words: "Officers may be ordered to attend camps of instruction, etc.," instead of "attendance will be required."

Paragraph (*d*) says: "For those officers who are prominent in the profession, who are specialists, as surgeons, internists, pathologists, etc., who would in time of war be assigned to duty as specialists or for duty at base-hospitals—this course (correspondence) is not an essential. Both the correspondence course and the work in camps of instruction are considered highly desirable, but are *not* compulsory."

In short, the difference between the two corps seems to be mainly in regard to rank, period of appointment and obligatory service in time of war. Obligatory training is not insisted upon except in the case of first lieutenants, and even with them there seems to be a "mental reservation."

Before considering any new scheme of training we should review what has been done along this line since the creation of the Medical Reserve Corps in the Army and Navy. The record is a brief one. In the Navy the reserve medical officers (now numbering 145 out of a possible 300) have had no practical training whatever. A one-year correspondence course has just been inaugurated.

Although created by the Act of 1908, the Inactive Medical Reserve Corps, U. S. Army, justified its name until four years ago, when an impetus was given to its practical training in the Eastern Department by the experiment of a camp of instruction at Tobyhanna, continuing for a week. The following summer a few members of the corps were ordered to active duty for a week at the Gettysburg Veteran Encampment. In the summer of 1915 a successful medico-military camp at Tobyhanna numbered about forty members. Attendance at both camps of instruction was voluntary, officers paying all their own expenses.

Local associations, the active interest of the Surgeon General's office and instruction received from officers of the Medical Corps,

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U. S. Army, and of the National Guard, have led to a rapid increase of the membership, so that it now numbers about 2,700, the majority of whom will doubtless be transferred to the Officers' Reserve Corps.

Medical camps of instruction were ordered for the summer of 1916 at five different points, from Pennsylvania to California, but, on account of the shortage of regular officers incident to the mobilization, it was necessary to cancel them. Through the courtesy of the Plattsburg military authorities a medico-military camp was established there, which 130 officers attended, during three periods of two weeks each. Between 300 and 400 Medical Reserve Corps officers have been on duty with the Army. Probably fifty more were ordered to active duty during the summer, mostly on the border, though many were utilized in training and mobilization camps and at home stations. Although many had had no previous experience whatever, their record as to efficiency and adaptability has shown that they may be regarded as a valuable asset in time of war, *i. e.*, when they are associated with officers of the Medical Corps, U. S. Army. It is important here to note the fact that only service with troops in camp, or in the field, can supplement theoretical training. This was the great lesson of the mobilization to the civil surgeon, to whom this was a new experience.

An optional correspondence course for officers of the Medical Reserve Corps (Inactive) was instituted in October, 1916, to cover four years. This was received with considerable enthusiasm and about one-fourth of the corps began it, though many "fell by the wayside" before the end of the year. This will doubtless be the experience during the more advanced second year's course. Curiously enough the older and busier men seem to be most interested and find time for it, when the younger members of the corps plead lack of time (?). It is to be hoped that be not only will the course "expected," but required of them, as it is certainly "desirable" for all.

Such is briefly the history of the meager training of the Medical Reserve Corps (Inactive) to date. Those who have observed its results agree that it only serves to emphasize the fact that all optional military training (and especially medico-military) and active service are apt to be limited to a few enthusiasts, or to those with whom such duty is paramount, and cannot be depended upon when national, rather than local, interests are to be considered. The corps would have been seriously depleted during the past summer if the Act of 1908 had been strictly interpreted and if those officers who were unwilling, or refused, to accept active service were required to "forfeit their commissions," although this country was actually "in a state of war." This mischievous clause in the Act of 1908 was doubtless responsible for the

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abolition of the present reserve corps, and it is desirable that no such leniency will be shown to the medical citizen-soldier under the new one. The time for doubt or hesitation should be before, not after, he is transferred to the new corps.

A further analysis of the subject shows that two distinct times are noted in the title—in peace and in war. If any fact has been made prominent during the war now in progress it is that there is only *one* time in which to prepare for war. England has been most fortunate in being able to reconstruct, or rather to initiate, an entirely new system of training after war began (and this applies equally to line and staff), but it is more than doubtful if we would be given this opportunity. With us such organization and training as we can effect must be in peace, war offering rather a post-graduate course of instruction to reserve officers, who must be promptly utilized when the emergency arises. We shall, therefore, consider such a plan as will insure a progressive course of instruction in peace *for* war, and will be continued smoothly and without any change of policy after the call for mobilization.

The keynote of the whole subject lies in the word "practicable," which is best defined as "what can be accomplished with the means that one possesses, or can obtain." This at once disposes of theories, ideals and elaborate systems and brings us down to hard facts. What can be done in this country in its present attitude towards preparedness, under existing conditions in the medical departments of the Army and Navy, with the "funds available" and—the citizen-doctor? We must take things as we find them. Universal military training (especially for doctors) is still a hope of the future; the Medical Depart- is not the "favorite son;" the present fat year is only too likely to be succeeded by seven lean years, such as have preceded this one. Congress is an uncertain element in all human calculations, and the people are already asking what has become of the recent appropriations and how the expenses are to be met. We may not look forward with confidence to habitual generosity of that sort.

As for the medical profession, the consensus of opinion is that, although patriotic and willing to serve the country under the stimulus of foreign invasion, when the personal question is put up to it—of voluntary preparation in time of peace—enthusiasm wanes. Loss of time and money, professional and domestic duties, other more attractive sports than the game of war—all these assume the first place.

It is impossible for the professional soldier to consider this question from the standpoint of the civilian, and therein lies the reason for many of the harsh criticisms passed upon the National Guard, even those members who have sought to do their whole duty at great personal sacri-

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fices—especially the medical officers. There is justice in their complaint that they are penalized in the interest of the "slackers."

Some plan must be devised by which doctors can be trained for their medico-military service without interfering too much with their exacting duties in civil life. An attempt to meet this difficulty was recently made by the Surgeon General, by recruiting into the Inactive Reserve Corps many hospital internes and physicians just entering upon private practice, in the hope that, being young and enthusiastic and without family cares, they would respond more promptly to the call for service in training camps and duty on the border. As a matter of fact, during the recent mobilization, except those who were connected with the National Guard, there was a general unwillingness to accept service. It was the older men who freely offered themselves from a sense of duty. It was evident to the writer, who is in a position to know the facts from personal observation and experience, that all doctors are alike in this respect. They do not see the need of it. It simply does not appeal to them. The same indifference has been noted in regard to the attendance and interest shown by the younger members of the corps connected with local organizations, as well as in the correspondence course. The excuses invariably offered are lack of time (?), want of means, or apathy—the latter being the real one. It is desirable that such apathy should find no place in the Officers' Reserve Corps if it is to be an improvement over the present one.

Why is it possible to induce so many thousands of boys and men, of all ages and every condition in life (many of them doctors), to attend the Plattsburg Camp for an entire month, at their own expense, when a medico-military training camp can attract less than 10 per cent of a corps of commissioned officers in the Medical Department for a period of two weeks, at a time of the year when they are accustomed to take a vacation of from one to three months? This is a question which the writer has tried to solve, with indifferent success. So far as he has been able to explain it, it is due to the half-hearted encouragement of the Department, the lack of local enthusiasm and the absence of an active propaganda—especially in medical colleges, hospitals and societies—continuing throughout the year, with the single purpose of arousing interest in the Plattsburg movement. Medical journals have shirked their duty, though so plain and imperative. Every "rookie" at Plattsburg is a missionary and not only desires to return another year, but to bring new recruits. Can we affirm that of our tentative efforts with medico-military camps? It is not enough to issue circulars inviting men to attend. Earnest, enthusiastic members in every community must bring them. Unfortunately the plan of using the Plattsburg

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training as a means of recruiting the Officers' Reserve Corps has not been adopted; the Medical Department reverses this natural method by first commissioning its officers and training them in a desultory manner afterwards, sacrificing quality to quantity.

The fact that the student-camps are so successful as the nurseries of future line-officers leads one to ask why the same system could not be adopted in the case of medical students, thousands of whom might be easily and thoroughly trained during at least the last two years of their college course, so that they could be graduated at once into the reserve corps as efficient medical officers. This plan is not a new one, as will appear from an editorial in THE MILITARY SURGEON for November, 1916 in which is a quotation from the *New York Medical Record*, March 16, 1895, questioning the advisability of "adding to the already exhausting labors of our students." "Later," adds the writer, "when more time is given to medical education, courses in military sanitation, in the duties of national, state and municipal health officers . . . may profitably be added to the curriculum of our medical schools. And even now it might be possible to carry out this suggestion in some of the larger and richer schools, adding the course as an elective study, perhaps, and not at first making it obligatory at all." An eminent medical teacher is quoted as saying at this time: "Medical students now have as much as they can learn without bringing in outside matters. If the Government wants medical officers let it teach them." This represents the current views of civilians previous to the Spanish War, which furnished a sad commentary on them. In the light of the lessons of the present war, and the general interest in preparedness aroused by it, we may live to see all medical teachers agree with the editor's view "Only through the medical schools can the seed of such knowledge (*i. e.*, the care of troops) generally be disseminated, to fructify, it may be, in camps of instruction; and no graduate in medicine should be licensed to practice until he has demonstrated to the State Licensing Board that he knows the elements of the theory and practice of military sanitation."

The writer would go farther than this and believes that, if the subject was presented to them in the proper light, the heads of all our medical colleges would be willing to coöperate with the medical departments of the Army and Navy in establishing courses of instruction, not only in sanitation, but in field service, for third and fourth year students—at least for fourth year. Such courses should be optional at first (the student securing extra credit for attendance), and later obligatory, after their success has been demonstrated. To make them successful, not only must medical officers of the Regular Army, or National Guard, be detailed as inspector-instructors, but there must be an earnest

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and enthusiastic cooperation on the part of the faculties. If the universities can send students to Plattsburg, encourage the formation of battalions to stimulate and continue the summer training, and establish courses in military science, there is no reason why the medical schools cannot emulate them, especially as most of the latter institutions now number among their faculties members of the Reserve Corps, whose services should be gladly offered for this purpose.

Physicians attached to the local boards of health, as well as pathologists and bacteriologists, can be utilized for instruction in sanitation along military lines. This opens up a new field of usefulness for the older reserve officers, who are not required to do anything for the service in time of peace. Lack of time and an already crowded curriculum will be urged as strong arguments against the introduction of an additional "outside" subject, but this is hardly valid, for at least one of the larger schools has long sustained a chair of military surgery as a required study. A few hours a week would not work any hardship to teachers or students. Armories could be utilized for evening lectures, demonstrations, or examinations. The Adjutant-General's office would willingly supply literature, and it is not difficult to imagine enthusiastic students consulting medico-military manuals with quite as much interest and profit as their elders, especially under the stimulus of a prospect of entering the Officers' Reserve Corps as soon as they could pass the required tests.

But theoretical instruction is not enough. Many students join the National Guard and devote a whole evening every week to drills, as well as two weeks to camp in the summer vacation. Why cannot candidates for the Medical Reserve Corps do the same? Armories can be used for this purpose during the winter, while in the spring and fall Saturday afternoons can be spent most profitably on the drill-grounds of adjacent army-posts, or at suitable places in the country.

Much ground may be covered in this way, so that an intelligent student can gain a fair knowledge of the school of the soldier, hospital-corps drill and inspection, the elements of sanitation, field-work and customs of the service. It would not be advisable to burden his mind with the subjects of paper-work, or the duties of officers above the rank of first lieutenant. A third-year student who attended the medico-military camp at Plattsburg last summer profited by the instruction quite as much as did his eminent professors in the same class.

A "military flavor" may be imparted to the student's clinical work by teaching him to make his physical examinations as thoroughly as if he were examining recruits, in fact, a special course on this subject is desirable. If the hospital in connection with his school has formed

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a base-hospital unit (and its personnel is trained in the manner to be discussed subsequently) he will have an opportunity to observe the discipline and internal management of an institution destined to take an important share in a future war. He should be instructed in the proper method of administering typhoid prophylaxis and thus be impressed at the outset of his medico-military career with this essential point in practical sanitation.

It is assumed that the student will own and wear the knaki uniform for drills and inspections and that it will inspire him to renewed interest in his special work and to a just pride in it.

All preliminary training must be supplemented by a fortnight (better a month) in camp, after he completes his third year, or at the end of the fourth, if he can be released from his hospital duties, which is quite feasible. Every state should have its medical Plattsburg, where the students will serve with troops, if possible, or at least be subject to the same discipline and routine as in other camps of instruction. It is unnecessary to describe any fixed method, or schedule, as these will be determined by the Department and the instructors, who should, if possible, be regular medical officers.

The question of expense at once arises. It is hardly probable that the National Government would be willing to pay for subsistence and mileage. Some of the states might do so, especially in the East, after the experiment had proved to be successful. But the outlay would be comparatively small if state camps were established, for it would certainly be possible to obtain tentage and equipment. As the course would be optional, only the most promising and enthusiastic would attend, *i. e.*, those who would really profit by it. Even if only an average of forty-five or fifty attended from each state this would mean a valuable asset to the medical corps in the shape of 2,500 trained cadets.

To a practical mind this plan would seem to be fraught with far greater benefit to the service in time of war than is the present scheme of the Committee on Medical Preparedness, which aims to file away in the archives of the Surgeon General's office a list of 20,000 names of "eminent practitioners" who might be called upon in case of war, entirely untrained, unless they are previously drafted into the Officers' Reserve Corps for such training as they may elect.

The writer does not seek to minimize the difficulties to be encountered in inaugurating the proposed plan of preliminary training in this country. Public opinion, local prejudices, the different attitude of the Western States towards preparedness, our general opposition to the Continental system, our whole theory of government—are all opposed to any scheme savoring of compulsory service. Yet those physi-

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cians who were in Germany during the first days of the mobilization were impressed with the instant response of medical men to the call to active service. Each one, old and young, eminent and obscure, knew exactly where he was to report and, as soon as the summons came, left the laboratory and the operating room for his appointed duty, which he had anticipated for years. We may not hope to attain such a state of discipline in our civil profession, as the conditions are so dissimilar. But we can aim at it. A few earnest, enthusiastic apostles of medical preparedness in every community will do more to accomplish the desired result than any number of circulars distributed broadcast, or the present antiquated methods of recruiting. It is the individual who counts.

It will be urged that the time of the average hospital-interne is so fully occupied that he will be unable to devote any of it to military duties, but the young fellow who is really interested in the subject and has already had some preliminary training as a student, will not abandon it, especially if he looks forward to applying for a commission. The busiest man always finds time to do what he earnestly desires to do—whether it be his favorite sport, or some literary or artistic hobby. The interne can still give one evening a week to a more advanced course, or an afternoon to drill or field work. If any of his superiors are in the reserve corps, as will doubtless be the case, especially if they belong to the personnel of a base-hospital unit, a medico-military atmosphere should be preserved and the entire hospital force—doctors, nurses and orderlies—be trained with a view to possible active service, the internes being made to feel that they are important cogs in the machine.

Now that the Army Medical School is to become a sort of post-graduate institution, it should be possible to give hospital graduates a special course, such as is offered to reserve officers at the Naval Medical School, at which young men of promise could receive more advanced training before they begin practice. In this way not only would the regular corps be constantly recruited up to full strength, but those students who passed the examinations and preferred to enter the Officers' Reserve Corps would have the prospect of early promotion on account their known mental and moral fitness for higher rank.

In the writer's opinion the principal reason why there have been so many vacancies in the Medical Corps has been *the lack of interest in the service on the part of the Attending Staffs of our hospitals*, by whose advice and support their internes are so largely guided in choosing their future fields of labor. He feels no little satisfaction in reviewing the honorable careers of many medical officers in both services whom he has induced to devote themselves to their country.

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This brings us to the original question of the "practicable" organization, training and utilization of the Officers' Reserve Corps, to be composed of citizen-soldiers, whose mental and physical qualifications are supposed to be such as will eventually fit them to instruct and command the future volunteer army—a serious and difficult duty, the importance of which cannot be over-estimated. The Medical Department is fully alive to the responsibility, and the public will demand the same, or even greater, efficiency than it now expects of the profession in civil life.

The present plan of organization of the Reserve Corps recognizes two distinct classes of medical officers, juniors and seniors, the line between them, as regards the age-limit, not being clearly defined as in the line. In the regular corps it is assumed that every officer is able to perform any duty to which he may be assigned, unless disqualified physically. The frequent mental and physical tests provide for this state of efficiency.

In the Medical Reserve Corps, on the contrary, the opinion seems to prevail that no man over fifty is likely to be called upon for service in the field—an unfortunate inference, which has saddled the corps with a lot of "dead wood." An officer who never expects to perform the duties of a regimental surgeon, or to command a field hospital, will not, as a rule, voluntarily attend camps of instruction, or take the correspondence course. If, on the other hand, he feels that he is subject to the same rules as the regular medical officer, and to a similar (if not equally stringent) mental and physical examination for promotion, age alone will not be regarded as exempting him from active service with troops. Another reason for the apathetic attitude of the older men towards training in time of peace is the fact that so many of them are included in the base-hospital units recently organized under the Red Cross. "Why," they naturally ask, "should we be concerned about the question of personal preparedness when our work is already definitely cut out for us?" It is proposed that all the personnel of these units (subalterns, as well as officers of higher rank up to majors) shall be kept together intact and that none of them shall be assigned to any other duty by the Surgeon General, either in peace or in war, which would seem to deprive the Department of the services of many capable officers who might be needed in the zone of the advance, or as sanitary inspectors. It is assumed that all officers of these units will be placed in the Reserve Corps, when the first lieutenants at least, will be subject to the required training.

Under the present arrangement there would seem to be four groups of officers, classified as follows: (1) first lieutenants who may be assigned to any duty; (2) first lieutenants in the personnel of base hospi-

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tals; (3) captains and majors, who may be assigned to any of the duties of these grades either in the zone of the advance, or in the service of the interior; (4) officers of the same rank in base hospitals, under the command of a regular medical officer.

The question naturally arises: If certain groups of officers are to have fixed and invariable duties, is it advisable for them to have training along special lines, or shall the same training be given to all, irrespective of age and professional standing in civil life, supplemented by a special course adapted to their peculiar functions? It would not seem wise to adhere strictly to the provisions of the second circular of the Surgeon General, and to exempt even the "specialists" from all medico-military training, since the exigencies of the service, the recruiting of a large volunteer army and the shortage of regular medical officers would require a large number of reserve officers for service in mobilization-camps and on home-stations, even if base-hospital units were dissolved in order to furnish them. A "distinguished" major, totally ignorant of the routine duties of a camp or post surgeon, would be less useful in this capacity than an instructed medical student. It was painfully evident during the recent mobilization that age and dignity cannot cloak ignorance and incapacity. There will be little time to learn after war has begun. It will be a question of the right man in the right place. It is the experience in every war that the able and efficient eventually come to the front, but often after valuable time has been lost, not to speak of mistakes and disasters in the field. The Medical Department is not an exception, though the ability and capability of its individual numbers is usually known beforehand. This will not be the case with such an unknown quantity as the Reserve Corps, unless the same test is applied to it in time of peace.

It is unthinkable that a medical officer should be allowed to command, who has never learned to obey, or that he should be assigned to service with troops when he has had no previous training in camps of instruction. He has no "record" on which to base his claims for promotion, except that in civil life, and should at least be required to make one by his zeal, interest in his work and willingness to learn in any and every way, without regard to his own pleasure or profit. Unearned promotion, like unmerited praise, does not satisfy a real man.

The writer would then urge that all officers should be expected to attend camps of instruction, not only because they ought to be familiar with all the duties of their department, administrative, as well as medical, but in order to fit them for higher command. It is obviously absurd that they should be acquainted only theoretically with elementary facts in which their subalterns are instructed. The stimulus

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given to their juniors by the attendance and active interest of prominent members of the profession at the Medical Reserve Corps camps has been the main factor in their success. Association with officers of the Regular Army is a point of first importance to a civilian, who learns the "customs of the service" in this way better than he can do from books. It would be easy to establish graded courses at these camps, both for the younger men who have attended previous ones, and for their seniors who need more advanced instruction.

There is no reason why the older surgeons and specialists in base-hospital units should be entirely ignorant of military matters, until the outbreak of war awakens their dormant interest. If it is seriously proposed to keep the unit intact, its personnel should be trained together as a unit under the direction of the senior medical officer of the Red Cross, and the entire outfit thoroughly inspected at least once a year. The general misapprehension that such units may not be called upon in war to leave their home stations and establish hospitals at distant points should be dispelled, as great delay and confusion would arise if they were suddenly ordered to transport their entire outfits to distant points, to locate hospitals under an entirely different environment from that to which they have been accustomed.

There can be no question as to the propriety of requiring all officers of the grade of first lieutenant to attend instruction camps, as provided for in the first circular of the Surgeon General's office. There should be no compromise here. Any young officer who does not see the importance of such instruction and who finds it distasteful, in fact any who does not show enthusiasm and appreciation of his opportunity, would do better to resign *now*, rather than to wait until he is called into active service. The Medical Department has no use for men whose hearts are not in their work. Judicious weeding out of the inefficient is the only course by which to insure perfect team-work.

The writer has no new suggestions to make with regard to schedules of instruction at future medico-military camps, except to plead for a minimum of didactic lectures, especially in the line of paper-work, and a maximum of practical field-work, always with a view to actual war conditions. The time is short enough as it is and no attempt should be made to cover such a wide field as has been the case heretofore. The one purpose of the course is to ground the young citizen-doctor-soldier in the simple duties which he will be suddenly called upon to perform, thrown perhaps entirely on his own initiative. It will be found that he will quickly grasp and assimilate the important details.

The medico-military camp should be an integral part of the gen-

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eral training camp. The advantage of this was shown at Plattsburg last summer, when, on account of the shortage of regular medical officers, the student-officers were utilized in the post hospital, as regimental surgeons, assistant sanitary inspectors, etc., thus applying at once the principles which they had been taught. It is exactly the same experience which every young doctor must undergo in civil life, when he leaves the school and hospital and is suddenly thrown upon his own responsibility, plus the added experience of dealing with an entirely novel patient—the enlisted man.

This is only a repetition of the fact which we have already emphasized that the best school for a novice is service with troops. Nothing can take its place. An interesting paper by Maj. R. C. Turck, M. C., National Guard of Florida, entitled "Sanitary Field Problems on Miniature Terrain" (MILITARY SURGEON, December, 1916), shows how many practical problems can be worked out in a contracted space and with the simplest means—literally "sermons in stones." As the author remarks, the possibilities for study and for instruction are "limited only by the imagination of the instructors and students." This miniature war-game, first demonstrated at the Tobyhanna camp in 1915, should be a prominent feature of every medico-military camp.

The correspondence course has been recommended as "highly desirable" for all medical reserve officers, old and young. Is it? The writer feels that he is on delicate ground in criticizing this established method of instruction, and ventures to do so only after careful consideration of its advantages and drawbacks, based upon his own and the experience of intelligent students who have pursued it. It is still in the experimental stage in the Medical Reserve Corps and has not met with the reception that was anticipated. Many who began Course A dropped out, and of the survivors who finished the year, many did so because their pride, rather than interest, kept them in the ranks. It is already evident that not a few are already discouraged at the outset of Course B. Lack of time and lack of interest appear to be the principal excuses. Some of the older men regard it as *infra dig.* One of the best students in the course (who was most earnest and interested at Tobyhanna and spent a month as a Plattsburg "rookie) assured the writer that, while he expected to continue the correspondence course from a sense of duty, he regarded it as impractical as a method of teaching civilians, and that he could learn more in one week in camp than in four years on paper. To the trained mind (and many teachers of wide experience are now taking the course) it savors too much of cramming for a college examination, with the certainty that few of the exact statements of the book will stick many days after the test. If the course is intended as a substitute for practical

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instruction it hardly accomplishes the purpose—in fact a certain class of minds, not accustomed to test books by men and things—may be started on the wrong track. A consultant who is overwhelmed by his learning is not helpful in the sick-room; a "book-soldier" may be a dangerous factor when he leaves his "Krieg-spiel" for the battlefield.

If the correspondence course is to be retained in its present form as an important agent in the training of the future reserve officer, it would be well to regard it as an introduction to, and a supplement of, camp and field work, which indeed is its real purpose.

Some plan must be devised to make the course less dry and academic, less like the monthly "tests" at our universities—not, however, at the expense of thoroughness and a strict system of marking. As it is, each student-officer crams his facts in the solitude of his own study, usually from a sense of duty, or because he hates to "lie down." His paper is returned good, bad, or indifferent—and that is the end of it, until the same process is repeated, and so on until the end of the term. Why not infuse a little human interest into it? The inspector-instructor of the medical officers of the National Guard knows all his students, their strong and weak points, teaches and inspects them in the armories, and examines their papers. Such an officer could be assigned to the medical section of the Officers' Reserve Corps in each State with similar functions (unless the over-worked instructor of the Guard could be further burdened). He would also be the director of the local organizations, to be considered later.

The New York Association of the Medical Reserve Corps introduced the plan of discussing each paper in the "A" Course at its monthly meetings. It is worth trying on a larger scale. In order to make the certificate mean something let it be given by the Field Service and Correspondence Schools as the result of an annual practical examination on all the monthly papers, rather than as a test of the best crammers. There is no reason why the exempt base hospital personnel should not participate in a correspondence course on such subjects as are but adapted to their special duties.

The two agents above mentioned for the training of the reserve officer are strictly under the control of the Surgeon General, who can make it obligatory or optional, as may seem best. But, there are other factors, quite as important for the success of the corps, which have thus far been neglected, although not through any lack of interest and encouragement on the part of the Department. The Medical Reserve Corps has not been an organized and coherent body like the regular corps. Local organizations have been formed in a few large cities and desultory attempts have been made to conduct them along the same lines as state

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branches of other national bodies, like the American Medical Association. Few survive, in spite of the encouragement given to them by regular medical officers stationed in their vicinity, as well as by the Surgeon General's office. This is due to several causes—the absence of any definite plan of work, the loose cohesion between the somewhat heterogeneous bodies, and the absence of motive power in the shape of enthusiastic leaders. A national association of reserve corps officers (with an active, vigorous central government) composed of local societies in every State, similarly energized and in close touch with the Surgeon General's office, must become an accomplished fact. The writer's recent attempt to form such a national association failed because of local indifference, or pessimism. Strangely enough some of our principal medical centers have never formed branches. The head of the local society should not only conduct lively monthly meetings, at which medico-military questions are freely and intelligently discussed, but should know every member of his organization, so that when the Department needs an officer for a certain duty, he will be in a position to furnish the desired information and will provide the best man.

The influence and example of an earnest, enthusiastic president, who is widely known, and respected in his community, would be incalculable. Under the stimulus of his own personality and coöperation with the Department the members of his branch would unite with him in cheerfully fulfilling all their obligations, from choice, as well as from a strong sense of duty. Affiliation with the National Guard would throw open the armories for drills, demonstrations and discussions, while neighboring army posts could be utilized for practical instruction. These aids to the training of reserve medical officers are, and have been, at the disposal of local organizations, but they have rarely (except in three or four cities) taken the trouble to use them. It has always seemed to the writer to be unfortunate that the older members of the Medical Reserve Corps have not kept in closer touch with the officers of the regular corps, not merely in giving them opportunities for clinical study, but in acting as consultants at the adjacent army posts and thus cementing the bond of union. It would be to the mutual advantage of both. It may seem utopian, but the writer even cherishes the hope that a few of the more energetic officers of the Reserve Corps, holding the rank of captain or major, will be allowed to take the regular medico-military course at Fort Leavenworth.

How can the Medical Section of the O. R. C. be utilized in time of peace? Tentative efforts have been made in this direction, but always as if the Department was asking an unusual favor, instead of conferring an honor and a privilege. First lieutenants may be ordered to temporary

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duty "with their consent." Such service can be rendered more agreeable, if not desirable, by limiting it to their home stations, to certain hours of the day, and to duty for which their special training has rendered them best adapted—examination of recruits, sanitation, post hospitals, or temporary duty in camps, if the officer has had previous experience. The selection of suitable men would be greatly facilitated by the formation of the local organizations before mentioned.

No attention has been given to the training of young officers for service in medical supply depots, where special qualities are requisite, especially methodical habits and considerable business training. The importance which such work would assume in war justifies the experiment in time of peace. A few hours could be devoted profitably to it for several weeks without interfering with private practice. Master spirits in the staff departments have developed from such sources. It is better to discover them beforehand, than to be obliged to try out several incompetents in great emergencies before the right man is found. It would be an excellent idea to have selected reserve officers attend maneuvers of the regular army, or National Guard, as medical observers and submit their reports and recommendations to the Surgeon General, as indices of their powers of observation and judgment. Reserve officers connected with the local boards of health are in a position to develop along military lines, and to submit valuable suggestions based upon their personal experience.

As already stated, the senior members of the O. R. C., especially if released from obligatory training, should not be allowed to "rust out" from a medico-military standpoint. Specialists in bacteriology and sanitation should always be available for temporary duty as consultants, and surgeons and internists should respond cheerfully to requests for advice and assistance from their confrères in the regular corps. Heads of base-hospitals should be responsible for the discipline and training of their personnel in time of peace.

It is not too much to expect that an officer of the reserve corps who has observed the practical results of temperance and attention to hygiene in the army will be in a better position to enforce the same principles in civil life, both by precept and by example, and to act as a missionary in the cause of prophylaxis. It is advisable that his own physical condition should be reported every six months. "Fitness reports" should be a prominent feature in the Medical Reserve of the Army, as it is the Navy.

It is vain to speculate regarding our next war, its cause, extent, or duration—whether it will be with a neighbor or with a foreign foe. That it will come suddenly we may safely prophesy. It is admitted that recruiting for the Regular Army is discouraging and that the National

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Guard cannot be depended upon in the first line. Our people are not yet ready for universal military service; we must depend on a large untrained volunteer force, since our Government assumes that an American citizen can do anything without knowing how. The Medical Department has its work cut out for it. It made good on the border, but by detailing over forty-six per cent (!) of the regular corps to assist the surgeons of the Guard. There will not be enough to go around when our "pathetic army" is expanded to half a million. We seem to be totally unable to visualize the conditions in the present war, or to apply them to our own country. But we must. We shall need at least 10,000 medical officers—not on paper, but ready for duty. Training in war means training and experience at the cost of the untrained enlisted man—the blind leading the blind. The writer cannot admit that such training is "practicable." It must precede, not follow, mobilization. Utilization of the available reserve officers will thus be the first consideration. The majority of the first lieutenants will be needed at once in the large mobilization camps to examine recruits, administer prophylaxis, etc. Officers of higher rank, who are not ordered to home stations to take the place of regular officers, will, under the direction of the regular corps, examine, organize and drill enlisted men of the hospital corps, and be assigned to ambulance companies, according to their previous experience and ability. New field hospitals must depend on the reserve corps for most of their personnel. As the volunteer regiments are mustered in majors will be assigned to them as surgeons, but only after their fitness has been thoroughly tested. There will be no veterinary surgeons in our next war, except for four-footed animals. It is assumed that the responsibility of a separate command will not be entrusted to a novice, or to one who owes his rank to political preferment.

At the front it is expected that *every* member of the medical section of the Officers' Reserve Corps will do his whole duty, whatever may be his age or rank, whether in the zone of the advance or in the service of the interior, subordinating his own interests to the will of his superiors. A large number of physicians will suddenly be called from civil life to administrative duties amid surroundings which are strange to them. Great care must be exercised not to assign them indiscriminately to important posts without preliminary training. It will be preferable to keep them as long as possible at their home stations, especially if their medico-military information has been obtained entirely from books. It is no reflection on a tyro's capacity and intelligence to assume that he knows nothing about the varied functions of a medical officer until he has proved the contrary.

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A recent critic of the Medical Reserve Corps (Inactive) has referred to its officers as such "in name only," although regularly commissioned in the U. S. Army, since under the Act of 1908 they cannot be required to accept active service in time of war. The record of the corps during the past summer would seem to refute this statement. On the other hand, the number of resignations and discharges and the small attendance at the medico-military camp, clearly indicate that the system is faulty and that in order to improve it, it is necessary not only to train the future Reserve Corps, but to develop in the individual a stronger sense of duty, without which an officer is truly such "in name only." No conscientious physician would think of allowing his own pleasure, or convenience, or even ill health, to interfere with his duty to his patients, but when the question of a temporary sacrifice for his country is raised he easily finds an excuse. This is one of the curious inconsistencies of human nature which it is difficult to explain.

Since writing this an interesting article has appeared in the December number of THE MILITARY SURGEON, by Lieut. A. C. Burnham, M. R. C., U. S. Army, setting forth the respective advantages of the O. R. C. and the Medical Corps of the organized militia, in which he expresses his preference for the latter, concluding as follows:

> From the foregoing the conclusion is reached that, except for those physicians who are financially so happily prepared that they need have no thought of pecuniary returns, the National Guard would seem to offer what is apparently the best opportunity for the physician to aid in the general program of preparedness. In addition to this it would seem to give the officer, who is able to devote the required time, the opportunity to aid in the preparation of others for military duty.
>
> Consequently, it would appear that if the National Guard is to be continued, in its present form (which can only be decided by time), it is advisable for the practicing physician to ally himself with one of the units of the National Guard if there is a vacancy and an opportunity for advancement.

The writer cannot accept this view for the reasons given by the author himself—the uncertain future of the Guard and the fact that the number of vacancies is necessarily limited.

As the editor rightly observes: "In war the rewards in promotion and position for efficient service are quite as likely to be conferred upon the Reserve as upon the State officer, while in peace there are but few medical officers of the National Guard above the rank of major, which rank is also attainable in the Reserve."

The Medical Reserve Corps of the United States Navy is still in the experimental stage. Following closely the act of 1908, the act of August, 1912 copies the defects to which attention has already been

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called. The proposed increase in the Navy will affect favorably the new act of August, 1916, superseding the former one and providing for a larger reserve corps, with increased rank, and authorizing a course of practical training, which has not yet been inaugurated.

Personal communications from the Bureau of Medicine and Surgery, and from officers of both the regular and reserve corps, justify the statement that up to the present time no plan has been formulated. An elementary correspondence course, extending over one year, was established in October, 1916, in which 140 officers were enrolled—a gratifying evidence of their desire to learn something about their duties. On account of the small size of the corps the reserve officers are all carried in the Navy Register as "unassigned" junior lieutenants, although in reality they are more "inactive" than are those of corresponding rank in the Medical Reserve Corps, U. S. Army. A review of the list shows that they are gentlemen of high professional standing, the average age being from five to ten years lower than in the Army. New applicants are required to be under forty-five years of age—a distinct advantage which should be seriously considered in the case of the reserve corps of the Army, with such exceptions as are proper in this arm of the service.

It is also evident from the circular of information that the mental and physical examinations are (at least theoretically) stricter and that the physical condition of every officer is reported at intervals of six months, another excellent feature.

Bulletin No. 1, on "Orders to Active Duty," issued to the corps by the U. S. Naval School, contains the exact information needed by the novice and should be followed more closely by the Medical Department of the Army. Many reserve officers ordered to the border were absolutely ignorant of the elementary details so clearly set forth in this bulletin.

The object of the new correspondence course is to give the participants a theoretical knowledge of their duties, "so that, in case of being suddenly called to active duty in an emergency, they will be to some extent prepared." It is explained that the only duties of the Medical Reserve Corps in which they would not be associated with medical officers of experience would be in connection with recruiting, or as medical officers of auxiliary ships. In all other assignments, whether on shipboard or on shore, they would not be thrown at once upon their own initiative. This is a wise provision under existing conditions, since it insures the constant supervision of untrained reserve officers by those of the regular corps, and promotion to higher rank according to length of service and fitness—the only proper qualifications. The age of retirement (fifty-five) is hardly an advantage in this branch of the reserve.

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Allusion has been made to the fact that the privilege of attending the Naval Medical School during the regular or special sessions, at their own expense, is extended to a limited number of officers under forty-five years of age, an excellent idea which might be adopted by the Army. Not only should promising men be urged to attend the school, but the character of their work should be noted in their record. Such practical training as is contemplated is evidently confined to war. Is there no scheme that is "practicable" in time of peace?

The conditions in the Medical Reserve Corps of the Army and Navy are essentially different, since the Army is a more variable quantity, subject to indefinite expansion under war conditions, by the addition of a large volunteer force. The Navy, even on a war footing, is more or less fixed. The number of medical officers needed is practically known beforehand and their stations assigned. On the other hand, their duties are more varied than are those of the Army surgeons and require even more versatility, since they must be both sailors and soldiers, at home, on ship and on shore. Moreover, they are always on the fighting line. If such wide medico-military knowledge is demanded of the medical corps, that of the reserve should certainly not be negligible. Service with troops is the *sine qua non* for the medical reserve of the Army, why not for the Navy? Even if the officers are expected to be associated with those of experience, would they not be more useful if they had some preliminary training?

The exigencies of war, the wastage of regular officers resulting from a modern naval engagement, can only be supplied by the reserve. Hospital ships and base-hospitals will need their full quota, and it may be necessary to assign reserve officers at once to important posts on ships of war. A large corps of trained reserves must be on call. This can be provided for only in time of peace. The Navy will meet the first shock of a foreign invasion, and even the limited time allowed for the sudden expansion of the Army will not be granted to the Navy.

In order to recruit the Medical Reserve Corps to its full strength the service must be made attractive. Service on shipboard is the first step. During the past summer, when the "Naval Plattsburg" was inaugurated, it is true that an opportunity was given to the corps to enroll, but no effort was made to train them along medico-military lines. It would seem as if it would have been an excellent opportunity to distribute nearly all its members among the different battleships for a month's training that would have been invaluable. It should certainly be the future policy of the Bureau of Medicine and Surgery, even at the expense of sacrificing space allotted to the "rookies."

Reserve officers should be familiar with the practical work of hos-

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pital ships, not only the younger officers, but the older specialists who will be assigned to them. Opportunities for instruction could easily be afforded while these ships are in port, and a month's cruise would be more valuable than any details to be learned from books or lectures. The regular officers would certainly be glad to cooperate in conducting courses of instruction. Naval surgery, and the disposition of the sick and wounded during and after an engagement, is a specialty in itself, quite distinct from the purely military side, so that the most experienced civil surgeon cannot adapt himself to its requirements as easily as his confrère in the Army.

Since the shore duties of a naval reserve officer are practically the same as those of the army surgeon, except that he will not be attached to large bodies of troops, there is no reason why he should not have similar instruction in training camps, the two corps being united, if it is not practicable to maintain separate camps. Service with landing parties, and in temporary marine camps, could be a part of the experience gained during the practice cruise. Sanitation and a familiarity with tropical diseases and their prevention cannot be learned from books alone.

The suggestions made with regard to utilizing the means already at hand for instructing the Reserve Corps of the Army apply equally well to the Navy. Regular officers could easily be detailed for this purpose and would take the same interest in the work as do those in the Army who have engaged in it. As a matter of fact, the medical branch of the Naval Reserve Corps is an unknown quantity to their associates in the Navy register—simply a list of names. Many are quite indifferent about it or do not even know its apparent functions. It seems unfortunate that they are not in closer touch. To the line officers the corps seems to have no *raison d'être*. How can civilians be expected to know, or to be inspired by, the glorious traditions of the Navy without the personal touch which alone maintains the "customs of the service"? No correspondence course can make them a reality.

Many opportunities for practical training are afforded—on ships in port, in naval hospitals, marine barracks, etc, and the small size of the corps favors such a plan more than in the corresponding organization in the Army. The examination of recruits is all important. An admirable circular on this subject has been issued for student-officers. Groups of six or eight officers can be formed and instruction given, along the lines of the section teaching now pursued with so much advantage in modern medical schools. The character of the men on the list insures a general and enthusiastic response to such a plan.

There is at present no *esprit de corps* among them, because there

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has been nothing to arouse it. The recommendations already made apply forcibly to them. Affiliation with the Naval Militia, the formation of local societies, with monthly meetings for purposes of mutual instruction, drills, annual inspections—all these are quite practicable. The corps should be recruited up to its full quota with men, not allowed to apply simply because they desire a commission, but carefully selected and invited to join with a full understanding of their responsibility.

There is no reason why the medical reserve corps of the united services should not themselves be united and work together in time of peace, as doubtless they will do in war. This brings up the question of separate base-hospitals for the Navy, which must be organized along the same lines as in the Army—before the emergency arises. They should not differ to any considerable degree from those in the Army, but should be coördinated, so that if necessary medical officers of the two corps could either work side by side, or could be shifted from one hospital to another without interrupting the regular routine. A thorough knowledge of their medico-military, as well as strictly medical, duties can alone secure perfect coördination.

In short, the writer pleads for the same training for the Naval as for the Army Reserve, plus the additional instruction necessary for the ship-surgeon. This may seem to be a formidable program to lay before civilians, but it is "practicable" if one considers the fact that the means are always close at hand, if they are only used. Courses that are wholly optional must be made attractive if they are to become popular. Every college professor knows this. "To be interesting a thought must pass through the mind of an interesting person. In the process something happens to it. It is no longer an inorganic substance, but it is in such form that it can be assimilated easily by other minds."

The writer is under no delusions with regard to the defects in the present Army bill, which has already been tried and found wanting. He regards the Medical Reserve Corps of the united services as merely make-shifts, the Officers' Reserve Corps being only a phase of the process of evolution which will culminate in universal service, medico-military as well as military. No American, no doctor, can shift that responsibility. In the fiery furnace of Europe, in the hour of our country's need, it is the *individual* who must ultimately decide for victory or defeat.

All the suggestions that have been offered in this paper, tentative as they must be, will avail little unless there is some irresistible motive power behind them, a man of action—a force constructive, rather than destructive—such as may be found in our profession.

He will not seek notoriety, or offend against the "Regulations,"

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either in speech or in print, but will work steadily, untiringly, with a single purpose, owing no allegiance except to his own conscience and to his superiors. Through his personal influence and example he will inspire other individuals, groups of individuals, states, the nation. Circulars, committees, great names, public meetings, inspired articles, money—all these agents are useful in the cause of preparedness, but they do not affect the medical profession as much as they do the laity, perhaps because we are more accustomed to "look quite through the deeds of men."

With us the spirit of service is ever present; it needs only to be directed into proper channels. "Where there is no vision the people perish." Shall we in this hour of decision, through apathy, or indolence, or selfishness disregard the ancient warning?

HENRY C. COE.

THE RED CROSS

Just now—most opportunely—are published the revised regulations governing the employment of the American Red Cross in time of war.

Colonel Kean, M. C., U. S. Army, Director of War Relief, and his efficient staff have placed the relationship of the personnel of the Red Cross to the Army and Navy in such clear and simple terms that "all who run may read" and none need fail to understand the rules of the game.

The importance to the sanitary departments of such an understanding in advance, and the education of the people in the fact that war relief is no "go as you please" affair, is almost as great as the training of our sanitary soldiers in the theory of their trade.

Today, though the European War is in its third year and the relief we are extending to the belligerents is, and has been, liberal, there is occurring much lost motion, because of overlapping of work through the independent action of many minor organizations, all of which would be much more effective were they correlated to the National Red Cross.

Such a diversity of activity, of course, would not be permitted in the event that we ourselves were engaged in war, for the President has specifically provided as authorized by law, "that the American Red Cross is the only volunteer society now authorized by this Government to render aid to its land and naval forces in time of war."

With this fact in view, it is extremely important that our people should be made acquainted with the regulations which will make their work for their own soldiers most efficient. Nothing could so quickly and satisfactorily accomplish this purpose as the general organization within the male membership of the chapters, of the various units set

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forth in the recent regulations, which are more particularly for men. The women, already well organized, are doing splendid work, and the only thing further we could wish for them is that every woman in our broad land was a member of the Red Cross and all personally interested in its activities.

Primarily each chapter should organize as many Sanitary Training Detachments as possible. These are really recruit schools and serve as feeders to the regular field formations which are the ambulance company, base hospital, hospital unit, surgical section, emergency nurse detachment, information section, refreshment unit, and supply depot.

These training detachments are analogous to the units of the St. John Ambulance Brigade, which is part of the British Order of St. John of Jerusalem.

The story of this ancient organization is full of interest and contains many valuable lessons for us, so we venture to refer to it here somewhat *in extenso* in evidence of the fact that our Red Cross is not indulging in an experiment in its effort to train the people in sanitary field organization and work. Then, too, it is important that all our membership should know, as doubtless most of it does, something of the history of the prototype of our proposed Red Cross organization, particularly because, in the event of hostilities, Medical Officers of the Army and Navy will be required to use these instrumentalities.

The Order of St. John of Jerusalem was established at Clerkenwell at the beginning of the twelfth century, and became rich and powerful. Suppressed by Henry VIII, it was again incorporated in 1557, and again, during the reign of Queen Elizabeth, its funds were "annexed to the Crown."

In 1827 the order was revived, with such alterations as the changed conditions demanded, and in 1888, in recognition of its excellent work, a new charter of incorporation was granted, restoring the ancient title and Queen Victoria became the "Sovereign Head and Patron of the Order," to be succeeded by King Edward and now King George.

The order controls two working organizations known as the St. John Ambulance Association and the St. John Ambulance Brigade, which are quite distinct. The work of the former is to disseminate a knowledge of first-aid to the ill and injured, and to make and furnish ambulance matériel.

In the Ambulance Brigade are combined the ambulance and nursing corps, the functions of which are preparation to meet emergency conditions in peace or war.

This is a well-defined organization on military lines, with prescribed regulations, uniform, equipment, and a formal drill. There is a com-

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manding officer, known as the Chief Commissioner, whose headquarters are at St. John's Gate, London, and a chief medical officer. Each district has its deputy commissioner and staff, and is subdivided into corps and divisions. The officers and noncommissioned officers are honorary surgeon, superintendent, ambulance officer, sergeants, and corporals. A first-aid certificate from the association is a prerequisite to membership in the brigade.

The work of the St. John Ambulance Brigade in South Africa was of the most commendable character, and affords the strongest argument why some such organization should be established by our own Red Cross. The brigade sent over 2,000 members to the Boer War, thus providing a quarter of the entire sanitary personnel of the British army in the Transvaal. What suffering might have been saved our men could we have had such a trained force to fall back upon during the Spanish-American War.

Numerous testimonials bear evidence to the efficiency of the Ambulance Brigade. Sir Conan Doyle, referring to the epidemic of typhoid fever at Bloemfontain, says: "When a department is confronted by a task which demands four times more men than it has, the only way of meeting it is for each man to work four times as hard. This is exactly what occurred, and the crisis was met. In some of the general hospitals orderlies were on duty for thirty-six hours in forty-eight, and what their duties were let those who have been through such an epidemic tell. We have not the trim, well-nourished army man, but we have recruited from the St. John Ambulance men who are drawn in this particular instance from the mill hands of a northern town. . . . There is none of the dash and glory of war about the tired men in the dingy khaki suits, . . . and yet they are patriots, these men, for many of them have accepted a smaller wage in order to take on these arduous duties, and they are facing danger for twelve hours out of twenty-four, just as real and much more repulsive than the scout who rides up to the strange kopje, or the gunner who stands to his gun with a pompom quacking at him from a hill. When the scouts and the Lancers and the other picturesque people ride in procession through London, have a thought for the orderly, who has given his best for his country. He is no fancy man—you do not find them in enteric wards—but for solid work and quiet courage you will not beat him in all that gallant army."

General Buller wrote: "No men could have behaved more admirably than my Imperial bearer companies, or 'body snatchers,' as the men used to call them. The only fault I had to find with my men was that they were too venturesome, and would go right into the firing line after wounded men. Whether for their mercy, their tenderness, or their

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endurance, my bearer companies deserve the highest praise, and my only regret is that from the very nature of their duties their work went more unrecognized than I could have wished. I am perfectly satisfied of one thing: Good ambulance companies are the greatest possible help to any commander, because he can and may expect that his men will, all of them, devote their whole attention to their main business, namely fighting, if they know that their wounded comrades will receive immediate care."

Regarding the civil work of the St. John Ambulance Brigade, it is constantly on duty, meeting the casualties of the industrial army in the shops and everywhere; moreover, it is ever at hand, prepared to care for the ill and injured in great assemblies throughout the land.

Of this organization, the Chief Commissioner wrote a number of years ago, "The noble work performed so unobtrusively throughout the country by the St. John Ambulance Brigade in time of peace, although still unheard of or not understood by the mass of the people, is undoubtedly becoming more and more appreciated, and as the brigade has now proved its capabilities of rendering important services to the country in time of war, it may reasonably be hoped that the time is not far distant when this important department of the Order of St. John will be universally recognized as a national institution of the highest value, and will be accorded increased assistance and support on the part of the public, for whose benefit alone it exists." No doubt it has continued to demonstrate its usefulness and in the present war has covered a much larger field.

To go somewhat into particulars of the sanitary training detachments of our Red Cross, by reference to circular 136 A. R. C., we find that it reads in part as follows:

Sanitary Training Detachments are organized primarily for the purpose of instructing men so that they may be able to serve efficiently in the Sanitary Service of the Army and Navy. After receiving such training it is hoped that should the country become involved in war they will enlist individually in one of those services. Being already partially instructed there will be a great saving of time as they will be able to undertake those important duties without much additional training. Individuals who join Red Cross Sanitary Training Detachments will be required to enroll in the Red Cross service for a period of two years. They will also be requested to signify their willingness to enlist in the Medical Service of the Army or Navy in case of war, *but will not be required to obligate themselves to do so.*

A detachment consists of three officers (a Commandant, an Assistant Commandant, and a Quartermaster), and the following subordinate personnel:

Pharmacist 1, Section Chiefs 5, Mechanics 4, Carpenters 4, Cooks 2, Clerks 2, Privates 40, total personnel 61.

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The Commandant and Assistant Commandant must be physicians in good standing.

The Section Chiefs will have the title and rating of sergeants and one of them, selected by the Commandant, will act as first sergeant.

The Mechanics, Carpenters, Cooks and Clerks will have the title and rating of corporal.

It is hoped that one or more of these training detachments will be formed in connection with every chapter. It is regarded as a very important chapter activity and differs from the strictly military units in being primarily a chapter responsibility. They may also be formed among students of the smaller colleges and in industrial concerns which employ a considerable number of men. Many companies have already given considerable attention to first-aid instruction among their employes, but find it very difficult to hold their interest. After men have competed in one or more first-aid contests there seems to be little left to offer them.

By the formation of Red Cross Sanitary Training Detachments in such institutions and companies, it is believed the interest of the men can be maintained very satisfactorily. Through them men are given an opportunity to belong to a definite organization, to wear a uniform, to engage in drills and other exercises, and to acquire other valuable information, in addition to instruction in "First Aid to the Sick and Injured." It is felt that the formation of these detachments will meet a real need not only in industrial concerns but among college students, and will at the same time help the Red Cross to fulfill part of its obligation to prepare in time of peace to assist the armed forces of the United States in the event of war. One can readily appreciate that it will be real assistance to the Government, if, through the efforts of the Red Cross, men who have been trained to perform the important duty of handling and caring for the sick and wounded will present themselves for enlistment in the military medical service upon the outbreak of hostilities.

All chapters are urged to assist the Department of Military Relief by initiating the organization of such detachments in their respective jurisdictions. Furthermore, whenever the formation of Sanitary Training Detachments is undertaken by Red Cross Chapters it is the duty of such chapters to raise the funds necessary for the purchase of the equipment.

Instruction.—The instruction of detachments will be given by the officers and noncommissioned officers.

Where detachments are formed, and sufficient funds are available, it will be a great advantage if the services of retired or ex-noncommissioned officers of the Army, or of the Hospital Corps of the Navy, can be procured to act as first sergeants of such detachments. Their previous training will be of material assistance to the officers in acquiring a knowledge of sanitary drill regulations and imparting the same to their subordinates. Sanitary Training Detachments may also be used to meet emergencies which arise as a result of disasters in time of peace. They may also assist chapters to provide first-aid service on public occasions, when such action on the part of the Red Cross has been requested or is desirable.

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It is realized that it will often be difficult to give instruction to members of SanitaryTraining Detachments without unduly interfering with their usual vocations, or making the instruction irksome, so that the outline is offered simply to serve as a guide for the Commandant who should, with the assistance of his subordinate officers, give as much of the instruction as he finds practicable. When necessary in the judgment of the Commandant the work may be varied to meet any special needs of the men forming the detachment. It is recommended, however, that when detachments are formed, a definite schedule of instruction to cover the ensuing six months be arranged in *advance*, and that it be followed as closely as possible.

The courses of instruction and the equipment are also set forth in detail in the circular.

When the man has satisfactorily passed through the courses of instruction in the training detachment, he is available, with his consent, for transfer to any of the various formations mentioned in the beginning of this *comment*.

One of the most important of these is the Ambulance Company, for full information regarding which reference is made to circular 146 A. R. C.

THE MILITARY SURGEON cannot too earnestly impress upon our members the importance of a reasonably thorough knowledge of the object, organization, training, interior economy, and employment of the various Red Cross formations; they are supplied to help the Medical Department and they will greatly, provided they are intelligently and properly used; otherwise the Red Cross will quite likely establish a medical department of its own, wholly independent of the Military Medical Department as it did in Russia, with rivalry, bickering, overlapping, lost motion and consequent inefficiency—not to mention greatly increased money cost.

One of the really large problems before the Medical Department today, and which with us is practically unsolved by any personal experience, is the efficient use of civilian relief in the operations of the sanitary service.

MEDICAL PREPAREDNESS IN SAN FRANCISCO

A valuable and unusual opportunity has been presented to the members of the profession in San Francisco to hear a course of lectures on medical preparedness. The first course of fourteen lectures, given under the auspices of the Medical Preparedness League, has just been completed, and other courses are to follow.

"Be ye prepared" is a good motto for all who practice the healing art. The object of the league is to create interest in medical preparedness.

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Every citizen of the country should be interested in any plan which will prevent a repetition of the conditions of 1898. The public at large were to blame as much for those conditions as anybody else. They were not ready for medical preparedness. They had never given it serious consideration. Since that time there have been great changes in the attitude of the Army, the public, and the profession, towards the subject of health conservation and preservation.

The wonderful development of health conditions in Panama, the Philippines, and other tropical countries, and even right in our own country, has attracted the attention of our people—indeed, the people of the entire world—to the ability of American physicians to improve and preserve health. They have established a standard of prevention which the members of the medical profession who essay to keep posted on the advances in medicine should be interested in maintaining; which is possible only through "preparedness."

If there were no other reasons for civilian physicians to take up the study of medical preparedness for national defense, the general information to be gained by an investigation of the subject makes it well worth the while and the time. Whether or not the knowledge is ever needed by us for assuaging the horrors of war strife and killing, such as are now existent in Europe and below our own southern border, it is always needed in principle, in the great and continuous war of commerce and the battle of life, where health makes for success of the individual and the country.

As a student of the general trend of medical conditions the writer is of the belief that "medical preparedness leagues" should be organized in every county in the United States to disseminate a knowledge of preventive medicine through military methods. As the organized county medical societies represent usually less than 50 per cent of the profession, leagues should be formed upon broad and liberal lines, and should include both members and non-members of the county societies. Such a plan would give the entire profession a common ground to meet upon and become better acquainted, all to the benefit of the individuals, the profession at large and the nation. Medical men residing in localities far remote from military centers who pursue this work can study the same correspondence courses studied by all members of the Officers' Reserve Corps. The annual training camps would give them ample time and opportunity to put into practice what has been learned. Moreover, this study of preventive methods invites physicians to keep abreast of the times in medicine in its highest branches.

Lectures on medical preparedness are as instructive to medical men in civil practice, who do not intend to enter the Officers' Reserve

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Corps of the U. S. Army, as to those who do intend to enter that service. Whatever our private opinion as to the right and wrong of war, preparedness is always a good thing, for he who is best prepared is least likely to be attacked, or, if attacked, to fail in the emergency. As an illustration of the wide field of instruction covered, the titles and a synopsis of the lectures given in San Francisco are given below.

LECTURES ON MEDICAL PREPAREDNESS

Given every Thursday, from 4.30 to 5.30 p. m., for fourteen weeks, beginning September 7, 1916, in The Library of the San Francisco County Medical Society.

Thursday, September 7, 1916, 4.30 p. m.

1. The Organization of the Army: Line and Staff, and the Administrative Zones in War:

Maj. John W. Hanner, M. C., U. S. Army (thirty minutes).

Synopsis: Composition of Land Forces; The Mobile Army, and the Coast Artillery, Present peace strength authorized. Present war strength authorized—Line: Regiments, Brigades, Divisions, Field Armies, Armies. Staff: General Staff, Adjutant General's Department, Inspector General's Department, Judge Advocate General's Department, Quartermaster Corps, Medical Department, Corps of Engineers, Ordnance Department, Signal Corps. The Service of the Interior: The Service of the theater of operations, (1) Zone of line of communication; (2) Zone of the advance.

Discussion opened by Col. Guy L. Edie, M. C., U. S. Army (five minutes); discussion closed promptly on the hour.

Thursday, September 14, 1916, 4.30 p. m.

2. The Sanitary Service of the Premobilization Period:

Maj. Ralph G. DeVoe, M. C., U. S. Army.

Synopsis: (*a*) Examination of individual soldiers, physical, mental, laboratory; (*b*) Prophylactic treatment for smallpox and typhoid; for venereal diseases; (*c*) Communicable diseases: diphtheria, meningitis, etc., diagnosis, isolation, carriers. (*d*) Water and milk supply.

Discussion opened by Dr. Benjamin Jablons.

Thursday, September 21, 1916, 4.30 *p. m.*

3. Medical Supplies and Equipment. Col. Henry I. Raymond, M. C., U. S. Army.

Synopsis: Supply Tables of Manual for Medical Department, 1916: Post, Dental and Field Supplies. Equipment "A," "B" and "C." Sera and vaccines, how obtained? Field supplies held in custody of

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Regimental Surgeons in time of peace, what? "A Medical Reserve Unit." Base and Advance Medical Supply Depots. Field supplies for sanitary formations in the zone of operations. Individual equipment, Medical Officer.

Discussion opened by Maj. Morrison C. Stayer, M. C., U. S. Army.

Thursday, September 28, 1916, 4.30 *p. m.*

4. Diseases of War: their prevention, control and treatment. Maj. Lloyd L. Smith, M. C., U. S. Army.

Synopsis: Losses from sickness in the wars of the past century. Factors determining the high rate of sickness in war. Infectious diseases of the intestinal type; other diseases of interest. Preventive and remedial measures for dealing with disease in war.

Thursday, October 5, 1916, 4.45 *p. m.*

5. Sanitary Units in the Field, and Lines of Medical Aid. Capt. Leo C. Mudd, M. C., U. S. Army.

Synopsis: Sanitary formations in the zone of the advance; the field hospitals and ambulance companies, their supreme function to rid the fighting force of the encumbrance of the sick and wounded and thus promote its mobility. Sanitary units in this zone; their thorough preliminary training and organization and necessity in peace time. Numerous sanitary formations in the zone of the line of communications; in this war zone the services of Medical Reserve officers indispensable.

Discussion opened by Dr. Shadworth Beasley.

Thursday, October 12, 1916, 4.45 *p. m.*

6. The Medical Service of Base Hospitals. Capt. Morrison C. Stayer, M. C., U. S. Army.

Synopsis: Position, personnel, administration and functions. This is the hospital to which is adapted the university unit of Crile. Here all field records are completed and classified.

Discussion opened by Dr. Leo Eloesser.

Thursday, October 19, 1916, 4.45 *p. m.*

7. Field Records of the Army Medical Department. Maj. Lloyd L. Smith, M. C., U. S. Army.

Synopsis: Daily field report of sanitary personnel and patients. Reports of sanitary inspections. Certificates of identity. Diagnosis tags. List of sick and wounded. Return of casualties.

Discussion opened by Lieut. Col. Wm. H. Wilson, M. C., U. S. Army.

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Thursday, October 26, 1916, 4.45 *p. m.*

8. The Training of the U. S. Navy Hospital Corpsman. Passed Asst. Surg. Wm. Howard Halsey, U. S. Navy.

Synopsis: This subject has been chosen for two reasons: first, because of its being handled in a comparatively new way; second, because it is the keystone in efficient preparedness of the enlisted sanitary personnel of the Navy. The evolution of the hospital corpsman as it takes place in the Training School, and his further educational progress at a Naval Hospital, will be the principal divisions of the subject. The educational and disciplinary methods in operation at the Hospital Corps School will be discussed, and forms of practical instruction will be touched upon, with a short history of the Naval Hospital Corps School idea.

Discussion opened by Dr. André Lee, U. S. Navy.

Thursday, November 2, 1916, 4.45 *p. m.*

9. Map Reading and Military Tactics. Capt. Morrison C. Stayer, M. C., U. S. Army.

Synopsis: By map reading we mean not only the ability to grasp at a glance the general features of a map, but to form a clear conception or mental picture of the appearance of the ground represented by the map. This involves the ability to convert map distances instantly to the corresponding ground distances; to get a correct idea of the network of streams, roads, heights, slopes and all forms of military cover and obstacles. We will discuss: scale of maps; differences of elevation; contours; hachures; directions on maps; orientation of a map; true meridian; conventional signs; visibility.

Discussion opened by Capt. Henry C. Michie, Jr., M. C., U. S. Army.

Thursday, November 9, 1916, 4.45 *p. m.*

10. The Sanitary Service of War and the Demobilization Period. Capt. Ralph G. DeVoe, M. C., U. S. Army.

Synopsis: Examination of individual soldiers; physical, mental, laboratory, modified by field conditions and requirements of active service. Prophylactic treatment of smallpox and typhoid under like conditions. Influence of war on incidence of venereal disease. Communicable diseases as seen in war time: typhoid, typhus, cholera, meningitis, dysentery; facilities available in the field for diagnosis and isolation. Water supply in active service, in camps, semi-permanent and permanent; on the march. The demobilization period: precautions to avoid infection of civil population by returning soldiers; care of permanently disabled; pension records.

Discussion opened by Dr. Frank L. Kelly, California State Board of Health, and Dr. Benj. Jablons.

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Thursday, November 16, 1916, 4.45 *p. m.*

11. Wounds in War and Their Treatment. Maj. John W. Hanner, M. C., U. S. Army.

Synopsis: Wound-dealing missiles in modern warfare; small arms bullets, shrapnel, high explosive shells, grenades, bombs, aeroplane darts. Characteristics of wounds inflicted by various projectiles; infection. General treatment of wounds. Treatment of regional wounds. After treatment.

Thursday, November 23, 1916, 4.45 *p. m.*

12. The Army Ration and the Principles of Cooking in the Field. Col. Charles R. Krauthoff, Quartermaster Corps, U. S. Army.

Synopsis: Definition; varieties, garrison, travel, reserve, field, emergency, haversack, etc.; components and substitutes; the baking of bread in the field; cooking apparatus; management of the field kitchen; the feeding of the sick in field hospitals; the mess kit; individual cooking; liquid coffee; ration supply in the field.

Discussion opened by Prof. M. E. Jaffa, University of California.

Wednesday, November 29, 1916, 4.45 *p. m.*

13. Camp Sites, Field Sanitation and Camping Expedients. Lieut. Col. Frank B. Cheatham, Q. M. C., U. S. Army.

Synopsis: A typical arrangement of organizations in camp; effect of soil and environment; different methods employed in disposal of waste; water supply and some of the precautions to be taken. Cooking with field equipment.

Discussion opened by Lieut. Col. F. A. Winter, M. C., U. S. Army.

Thursday, December 7, 1916, 4.45 *p. m.*

14. Prevention of Quarantinable Diseases on the Border and at Ports of Embarkation. Surg. W. C. Billings, U. S. P. H. S.

Synopsis: The transmission of typhus fever by the bite of an infected body louse, the transmission of yellow fever by the Aedes calopus, and the spread of bubonic palgue by infected fleas will be discussed, and the sanitary measures to prevent the spread of these diseases will be outlined.

Discussion opened by Surg. L. L. Williams, U. S. P. H. S.

From the above list it will be seen that an excellent course of lectures were given. The men who gave them were in every way qualified and they spoke in a most entertaining and instructive manner. There was not a dry lecture among them. The writer of this paper looks forward to February 1 with great pleasure when the Spring course will begin.

CHARLES CROSS,
First Lieutenant, Medical Reserve Corps, U. S. Army.

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A second series of lectures is now being given every week from 5.00 to 6.00 p. m., for fourteen weeks, beginning February 1, 1917, at the County Medical Society Library, Butler Building, San Francisco, the subjects of the first of which are as follows:

15. Ambulance Company Service in War. Capt. Howard Clarke, M. C., U. S. Army.

Synopsis: Important relation of the service to the mobility of the Army, as well as to the relief of the sick and wounded; composition of, organization, administration, source of supplies and method of obtaining them; necessity of service being under medical officers' direction, and special training required to be competent; position and service of an ambulance on the march and in camp; work of an ambulance during and after battle; animal drawn vehicles and motor transport compared; nature of drill and instruction given ambulance company personnel, and their importance; rewards of the service. Discussion opened by Lieut. Col. W. H. Wilson, M. C., U. S. Army.

16. The Enlisted Force of the Medical Department of the United States Army. Capt. Leo C. Mudd, M. C., U. S. Army.

Synopsis: (1) Grades and Pay; (2) Training and Equipment. Grades with maximum and minimum monthly pay; The four junior grades are instructed in (*a*) Duties of the Soldier; (*b*) Bearer Drill; (*c*) First Aid; (*d*) Personal and Camp Hygiene, including the sterilization of water and disinfection; (*e*) Anatomy and Physiology; (*f*) Care of Animals, Equitation, Packing and Driving; (*g*) The Operation of the Sanitary Service in the Field. The four senior grades before receiving warrants must show proficiency in Arithmetic, Materia Medica, Pharmacy, Care of the Sick and Ward Management, Minor Surgery and First Aid, Hygiene, Discipline and Control of Men, Knowledge of Army Regulations, Nursing, Dispensary Work, Clerical Work, Principles of Cooking and Mess Management, and Medical Department Drill. Equipment: Mess Kit, Ration Bags, Hand Ax, Shelter Tent Half and Web Belt with its contents. Discussion opened by Capt. M. C. Stayer, M. C., U. S. Army.

17. The Application of the Navy Hospital Corps School Idea in the High Schools and Colleges. Passed Asst. Surg. Wm. Howard Halsey, U. S. Navy.

Synopsis: The desirability of having numerous groups of well-trained Hospital Corpsmen in war times has been well established. That this line of work is not without its appeal to young men is evidenced by the large number of American ambulances in the European war zone. Everyone should have a good general knowledge of first aid, hygiene and emergency nursing. There is no more attractive way of acquiring this

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knowledge than as a part of military training. Organization of Hospital Corps Companies in high schools and colleges and their efficient training would do much for the health of the community in time of peace and these same organizations would be a valuable adjunct to the Medical Military Department in time of war. Discussion opened by Dr. Andre Lee, U. S. Navy.

18. The Medical Officer as a Military Man. Lieut. Col. W. H. Wilson, M. C., U. S. Army.

Synopsis: The medical officer has many duties to perform other than medical. He has rank given him by virtue of his commission, to definitely fix his status. Various grades of rank with insignia, and their explanation. His military duties as (*a*) Surgeon in post; (*b*) as Commanding Officer of a General Hospital, he has similar duties to a Post Commander, in military administration; (*c*) as Commanding Officer of Field Hospitals and Ambulance Companies; (*d*) as Director of Field Hospitals and Ambulance Companies; (*e*) as Division Surgeon; (*f*) as Sanitary Inspector of a Division; (*g*) as Medical Supply Officer; (*h*) as Post Exchange Officer; (*i*) as a Quartermaster; (*j*) as Recruiting Officer. Here recommendation is made to have recruiting put entirely under the Medical Department. Discussion opened by Capt. Ralph G. DeVoe, M. C., U. S. Army.—*Pacific Medical Journal*, February 7.

THE MILITARY SURGEON is impressed with the practicability of the plan and scope of the course of instruction above outlined. To be sure San Francisco is fortunate in having available for such purpose a number of medical officers of the Army and Navy—though any considerable number should not be necessary. It would not be unduly difficult for one officer to give a weekly illustrated lecture on military sanitation during a semester, which would be largely attended by the profession and laity as well, and arrangements should be made to have such courses given in every considerable city in the United States.—*Acting Editor.*

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CURRENT LITERATURE

Observations on Fifty Laparotomies Performed for Gunshot Wounds of the Abdomen, by G. H. Stevenson, M.B., J. J. M. Shaw, M.D., Captain R. A. M. C., and C. Mackenzie, M.D., Captain R. A. M. C. *The Lancet*, July 29, 1916, p. 173.

The authors give the results in fifty laparotomies performed at a casualty clearing station, about 5½ miles from the fighting front in the trenches, located in a building formerly used as a college for French boys.

Many of the cases were operated upon from five to six hours from the time of injury, one was operated upon two and one-half hours after being wounded, whilst others did not reach the operating table until the expiration of twelve to twenty-four hours.

Expectant treatment was employed in the early part of the war, but the development of the clearing station with facilities for operation and nursing close to the line of fire has favored early operation. In the pre-operation days of the war a ward was especially set aside for treatment by the expectant plan in this clearing station, where all cases suspected of intraperitoneal injury underwent the treatment of starvation and morphine.

Figures from these cases give the following results: Total cases, 335; transferred to base, 201; died, 134. This gives a mortality of 40 per cent.

Compared to the operated cases, this low mortality is considered fallacious for the following reasons: (1) Many of the abdominal cases died at field ambulances, and the chief cases treated by conservation were those not considered to be intraperitoneal, when examined at the field ambulance. (2) Evidence of the number of intraperitoneal cases is entirely lacking. (3) There is no evidence of the future course of the so-called recoveries.

If we analyze the number of deaths with reference to the period of time the man *was able to survive* his wound, we find as follows:

Total number of deaths, 134; died in 48 hours after admission, 84; died after 3 days, 50.

These figures show that 37 per cent of the patients who died, survived their injuries over three days and then died of peritonitis as a result of leakage of intestinal contents, which could have in all probabilities been prevented if the cases had been operated upon at admission. Many lives among the fifty cases who died would have been saved by operative interference and doubtless some of the eighty-four cases might have been saved when treated likewise. We have reason to believe that of the 201 cases transferred—the majority after two or three days—the greater number were not injured intraperitoneally.

Types of Abdominal Wounds.—(1) Antero-posterior or postero-anterior wounds, which must of necessity be intraperitoneal.

(2) Wounds apparently intraperitoneal, but really extraperitoneal, like side-to-side wounds. The bullet follows planes of abdominal muscles without entering the peritoneum.

(3) Those which are doubtful, occurring in the flanks, nearly all of which

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require exploration during anesthesia to investigate the course of the bullet. These wounds are apt to perforate the large bowel or cause fracture of the pelvic bones.

(4) Wounds with entrance at a distance, like buttock, chest and shoulder wounds. Balls entering these parts range toward the abdomen in some cases, and enter the peritoneum. Such a lesion is apt to be overlooked.

(5) Those wounds involving peritoneal cavity, plus other important extra-peritoneal structures—*e. g.*, small intestine plus spine, small intestine plus bladder, stomach plus lung, etc.

Condition on Admission.—From a diagnostic standpoint the easy case is the severe one.

Patients who require immediate laparotomy are the prostrated kind. They are pallid, anxious and cold, having a bluish tinge about the lips which fades into the grey pallor of the face; a low petulant cry for water; complaint of pain on movement of the body or extension of the lower limbs; a wound in the abdomen, back, flanks, or buttocks; a rapid pulse of small, low tension; rigid abdomen, moving but slightly on respiration, with dullness all over or in the flanks, and generally accompanied with a history of vomiting. The diagnosis in such cases is evident at a glance, and operation is in order at the earliest possible moment. Although the patient may be pulseless, the best chance lies in operative interference.

A few hours of delay and observation are permissible if the patient has a fairly strong pulse below 95, with no history of vomiting, no signs of hemorrhage, when he can hold his breath for over five seconds without experiencing severe pain, when he can stand pressure on all parts of the abdomen except immediately around the wound, and when he can raise his head voluntarily from the pillow without much discomfort. Such a patient should be carefully watched, he should receive nothing by mouth, the pulse should be recorded hourly, and the nurse should report especially if the patient vomits after being made warm and comfortable in bed. In all cases of doubt an exploratory laparotomy should be made.

Operation is also in order in cases which show rigidity and tenderness localized on one side, or in one quadrant of the abdomen, at the same time that the appearance and pulse indicate a serious condition. In such cases, one is apt to find a missile lodged in a solid organ, usually the liver, or in the neighborhood of the uncovered part of the posterior wall of the large bowel, with clots of blood between the layers of the mesentery. Although not so urgent as cases exhibiting infection and hemorrhage in the general peritoneal cavity, it is always safer to operate in such cases.

Technique of Operation.—The technique in military practice differs but little from that in civil practice, but some points are worthy of note.

1. Preparation of Patient.—(*a*) Morphia is administered under the skin before operation, unless large doses have just been given at casualty clearing stations.

(*b*) Saline is given subcutaneously and intravenously during and, preferably, after the operation.

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(*c*) The iodine method to disinfect the skin is employed, save in cases of a wound involving a large area, when lysol is preferred.

(*d*) Excise entrance and exit wounds, but use fresh instruments for subsequent laparotomy.

(*e*) Before donning rubber gloves for the final operation, explore with the naked finger in all doubtful cases, especially in flank wounds, under anesthesia.

(*f*) Warm ether is the anesthetic preferred, given with the aid of an improvised apparatus, made out of a thermos flask and a pair of kitchen bellows, operated by the foot of the anesthetist.

(*g*) Patients are operated upon at once—a half hour after admission at most. Delay is poor surgery. Cases with apparently good prognosis, with distended abdomens, have been incised and blood has burst out as though the vena cava were cut. In one case of recovery, the iliac vein was severed.

(*h*) Employ the median incision by preference; it gives freer access to every part of the cavity. The missile is seldom found in lesions remote from the entrance wound, but experience demonstrates that little harm develops by letting it remain *in situ*.

(*i*) In wounds of the small gut, sew with fine thread in two layers, and avoid tension on the mesentery in continuous suture. End to end anastomosis is employed when resection is necessary, except in cases where several feet of gut have to be removed, and then lateral anastomosis is employed. As to suture compared to resection, many cases are best suited to the latter, and it is preferred since it is quicker than suture of many perforations, say twelve in number. Suture in the transverse axis is preferable to the longitudinal, and too much stress need not be laid on the narrowing which is apt to follow the latter, as the gut has great powers of expansion.

(*j*) Lesions of the colon require a different technique since they present a different picture. Unlike the lesion in the small intestine, the tissues surrounding the injury are much more involved and they exhibit a tendency toward secondary infection, and slough. In many of these cases, it is in order to excise a V-shaped piece of gut and then suture, whilst others require a colostomy. In many cases there is enormous hemorrhage, usually emanating from wounds having point of entrance in the lumbar region posteriorly.

(*k*) Wounds of the liver and spleen are usually packed, unless it is possible to suture them. Wounds of the kidney are not frequently seen. The slight ones are left alone without much risk; urinary fistulae usually get well. A kidney badly puplified should be removed.

(*l*) The gut is carefully washed with saline while outside the abdominal wound, and the abdominal cavity is thoroughly washed out with saline or eusol and mopped dry. Large drainage tubes are placed in the pelvis and flanks in badly infected cases.

(*m*) Abdominal incision is brought together in layers; some silkworm gut sutures are run through all the layers, save the peritoneum.

After Treatment and Sequelae.—The important symptom of collapse is treated by elevating the foot of the bed. As the pulse becomes stronger the head end is raised by placing two blocks under it, and as improvement continues,

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the Fowler position is gradually assumed and maintained until the danger of sepsis has passed. Small saline injections per rectum, with brandy, are given every four hours for the first twenty-four hours. Small sips of water, or milk and water, may be given by mouth at once. In cases where suffering from thirst and hunger are acute "chewing gum" has been allowed with good results.

The extreme restlessness, so common for the first two or three days, is best controlled by repeated administration of morphine. The distension noted in cases admitted, several hours after the time of injury and preceding operation, is treated by subcutaneous injection of pituitary extract immediately after operation. In other cases, distension is treated by turpentine enemata, or pituitary extract, followed in a half-hour by glycerine-enema. There is no doubt that pituitary extract is the most valuable drug in the after-treatment of abdominal cases; it is often followed by a motion of the bowels in a half-hour to one hour after the injection. The administration of pituitary extract is at times followed by intense pain, which may be avoided by giving 1/6 grain morphia with the injection.

Bronchitis is not so frequently seen since the administration of hot ether has been introduced. When it occurs, it is treated by giving a mixture of carbonate of ammonia and potassium iodide.

Vomiting and hiccough are treated by stomach lavage. They sometimes yield to the administration of small doses of bicarbonate of soda or tincture of iodine.

Pelvic abscess and suppuration of the *original wound* or *incision* appear as late sequelae. In badly infected cases, it is recommended to use catgut instead of thread in the deeper layers of the abdominal wound, as the latter are apt to prolong sappuration.

Notes on the Pathology of Wounds in the Hollow Viscera.—The everted mucous membrane of the small intestine with the characteristic rosette appearance is commented upon, it is present at the points of entrance and exit and this is the most common type of perforation noted, but at times in lieu of a perforation, the intestine is torn across in several places. The tear does not usually extend into the mesentery. A tear in the convexity of the bowel, the authors suggest, may be the result of vibratory force which is distributed at the point of impact, plus the muscular action of the bowel, aided by the tension of the mesentery. This theory of the effects of the vibratory or explosive force, acting on the weaker and outer segment of the gut, finds support in those cases of ruptured loops of small intestine in which the projectile sets up lateral waves, while traversing the abdominal parietes without entering the peritoneal cavity. Such cases were noted by Makins in the South African war and they have been frequently noted in the present war. The fact that the short pointed rifle bullet is unstable and frequently travels at a tangent to its line of flight should not be forgotten as a possible cause of complete rupture, rather than a simple perforation going in and out, such as occurs when the bullet makes a regular impact.

Another possible effect of vibratory force on the small intestine is the paralytic distension of the bowel. This is most frequently seen in resection cases, and

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its presence is properly attributed to the complete rupture of the continuity of the muscular coats which hinders the transmission of peristalsis. When distension is present to any extent, the prognosis is bad, and "bowel concussion," as it has been called, as a result of the lateral transmission of the energy of the bullet in the form of vibratory force, has been considered as a possible factor in the etiology of paralytic distension.

Large Intestine.—The wounds of the large intestine are frequently on the posterior and lateral aspect, and often extraperitoneal. Their gravity and greater tendency to sloughing than one finds in the wounds of the small gut is commented upon. Infection in the surrounding devitalized tissues is the result of contamination with virulent micro-organisms contained in fecal matter. Such cases are prone to spreading cellulitis and, unless promptly and effectually drained, they are fatal, as noted by the English surgeons in the Boer War. The wounds in the large gut have no marked features, and eversion of the mucous coat is not usually present.

Stomach Wounds.—These seem to have a distinct tendency toward infiltration and sloughing of the surrounding tissues, otherwise they present no features of note.

RESULTS

Out of the fifty laparotomies detailed in this important report, the recovery rate is surprisingly good—34 per cent. This is far better than results obtained in war hitherto and compares favorably with results after gunshot wounds of the abdomen by military rifle bullets in times of peace.

In a study of twenty-nine laparotomies which the reviewer analyzed from the Reports of the Surgeon General of the Army for the years 1898–1902—under war conditions, the recovery rate was 29 per cent. Twenty-nine laparotomies in another group analyzed from the same reports for the years 1903–1910, under peace conditions, gave a recovery rate of 38 per cent. A study of results of gunshot wounds of the abdomen by military surgeons, in peace and war, shows that the mortality after laparotomy, prior to the present war, tallied with the figures we have given, very closely. We should remember that the opportunities to control the environments in trench warfare are exceptionally good, when compared to like opportunities in armies which are constantly shifting their positions on the terrain. The results of the expert surgeons in the Anglo-Boer, Russo-Japanese and Turko-Balkan wars would have been far better, if their operating rooms had been located at fixed points near the fighting line.

All cases are operated upon at this casualty clearing station except the moribund. The view is held that in all intraperitoneal perforations of the gut, the victim is almost sure to die if not operated upon, and that it is right to give him a chance, even though the chance be so small as one in a thousand. Many of the cases were pulseless on admission, and in others the pulse was only felt "as a flicker" and yet two cases like the latter recovered. Four cases in which it was considered undesirable to operate ended in death shortly after admission. Times of stress, overcrowding, and an overworked personnel are the only conditions which prevent operation on practically all gunshot wounds of the abdomen.

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The report is accompanied by a tabular statement which includes a great deal of interesting data, and it concludes with the following summary of the parts involved in those ending in recovery, and in death.

Cases that recovered numbered 17. Small intestine alone 4, small and large intestine 3, large intestine alone 1, stomach and liver 2, liver 3, hemorrhage without perforation of intestine 3, wound of omentum 1, total 17.

Site of lesions in the 33 fatal cases: Wounds of small gut 10, large and small gut 9, large intestine alone 3, small intestine and bladder 2, liver alone 3, liver associated with other viscera 4, injury to omentum 1, fracture of the pelvis with intraperitoneal hemorrhage 1, total 33.

LOUIS A. LAGARDE.

Wounds in War and Methods of Treatment, by A. W. Desjardins, M.D. *Journ. A. M. A.*, Vol. lxviii, No. 1, January 6, 1917, p. 18.

The points of special interest to the military surgeon, brought out in the paper by Desjardins, are those concerning the treatment of wounds by antiseptics. Surgeons are as yet far from unanimous as regards the best antiseptics to be used in infected wounds, nor have they, finally, decided as to whether the use of antiseptic solutions in the treatment of "wounds in war" should be continued or altogether abandoned.

Thus Sir Almroth Wright, "contending that the antiseptics in common use have no penetration and, therefore, cannot reach and destroy the organisms in the deeper portions of the wound, strongly advocated the use by continued irrigation of hypertonic salt solution which he had found to cause a marked inhibition of bacterial growth and a rapid auto-digestion and removal of sloughs."

Dakin, working with the hypochlorites, announced the discovery of a new antiseptic for which he claimed that "wounds may be irrigated for many days without producing noticeable irritation." . . . "In addition to its antiseptic action, the solution exhibits marked capacity for dissolving necrotic tissue." . . . "The solution, however, was found to prove so irritating as to erode the skin over points where the fluid ran off the wound and the patients themselves howled with the stinging, burning pain and rebelled against its use." Dakin subsequently proposed the use of chloramin as a valuable antiseptic. Others advocate hypochlorous acid, some prefer silver nitrate solutions, still others favor ether dressings; Gray favors complete excision and immediate suture of the wound. According to Sir Anthony Bowlby, there exists a whole school of surgeons which, drawing its limited experience from this present war, "asserts that antiseptics are useless and considers that they should not be used at all."

The author, further on, states: "At the Ris-Orangis (hospital) we divided the patients into series of ten and treated the patients in each series with a different antiseptic solution, such as Dakin's, Wright's hypertonic saline, iodine solutions in different strengths, acetic acid solution, and sodium bicarbonate solution, with control cultures twice a week. Our results failed to show any distinct differences in the power of the different antiseptics used to shorten infection and hasten granulation—when the wounds were properly drained the

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infection soon subsided—but they did show that continuous irrigation, while of distinct value during the active suppurating stage of the wound, should then be discontinued and dry dressings substituted. Prolonged continuous irrigations seem to have a tendency to produce edematous, flabby granulations and to retard the healing process." The above-cited quotation would mean a compromise between the two schools of surgeons—between those advocating the employment of antiseptics and those favoring the dry method of wound treatment. A judicious appreciation of conditions must be allowed to point the way in which a wound may be treated most successfully. To the reviewer, it would seem that the treatment of infected wounds, to which class the vast majority of wounds contracted on the battlefield belong, must still be considered as problematic. From a purely theoretical and biological point of view, any and all of the chemical solutions used as antiseptics and differing in composition from that of blood and lymph, must be more or less injurious to all the tissues in an open wound with which they are brought into contact. These tissues already deprived of their normal environment, are exposed to the same injurious influences as are the infectious agents that they are to kill or the development of which they are to inhibit. Too much regard is had to the annihilation of the infectious agents and not enough to the preservation of the living tissues, on the activity of which the final healing of a wound must depend. When we reflect on the profound changes that occur in salt-water protozoa when they are transferred to deep water; when we have been brought face to face with the changes in development undergone by marine animals, after even the slightest alteration in the chemical composition of the sea water in which they live and which constitutes their normal environment, we must, also, realize the detrimental part played by all the disinfecting solutions used in the treatment of infected wounds, most of which solutions contain strong chemicals that are foreign to the composition of the tissues and the medium in which alone they thrive.

Admitting, as we must, the necessity of relieving an infected wound of the presence of all the foreign bodies, introduced into it from without, by mechanical means, the forceps, scissors and gauze-pads; granting, further, the absolute necessity of facilitating the exit of all the accumulated effusion and discharges by free openings, from the wounds; conceding, even, the doubtful utility of one short flooding of the entire wound cavity by some mild, isotonic antiseptic solution, in order possibly to remove all those minute foreign bodies that are beyond the range of normal vision, the tips of forceps and the meshes of gauze-pads; we might, in the best interests of our poor patients, and with an easy conscience on the part of ourselves, remain content to leave the final healing of the wound to nature, used, from time immemorial, to do its own repairing. "*Medicus sanat, natura curat!*"

The ideal antispetic remains to be discovered. Such an antiseptic must possess the attributes of a specific. It will come from either a bacteriological or some chemico-therapeutical laboratory. When it does, we will be able to prevent wound-infection on the battlefield by local application, as we now do tetanus and typhoid, by the subcutaneous administration of specific vaccines.

H. G. Beyer.

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BOOK REVIEWS

GUNSHOT INJURIES, HOW THEY ARE INFLICTED, THEIR CHARACTERISTIC FEATURES, COMPLICATIONS, ETC. Second Edition. By Col. Louis A. La Garde, U. S. Army, Medical Corps (retired). New York: William Wood & Company, 1916.

This well-known book requires no recommendation to military surgeons as it stands out preëminently the best treatise on this subject. It is the second and revised edition of Colonel La Garde's authoritative volume, prepared under the direction of the Surgeon General of the Army and published by authority of the Secretary of War.

Valuable additions have been made to the present edition on the use of certain types of machine guns and the method of fire from these weapons, also the use of high explosive shell and shrapnel in the "77" and "75" mobile artillery of the French and German armies. The composition of the compound bullet of the British Army and the way in which it has operated to renew the old-time discussion on the use of dum-dum bullets, is interestingly told.

The chapter on "Infection of Gunshot Wounds" is rearranged and, in view of the material addition to our knowledge of infection in war wounds, the greater part of the chapter has been rewritten. The rôle of the bacteriologist, whose function in war had hitherto been almost entirely identified with military medicine and military hygiene, is emphasized in the study and rearrangement of military surgery. The advances made in the scientific investigation and treatment of infected war wounds, as developed by the technique of the bacteriologist, exceed anything that has been noted since Joseph Lister first inaugurated the problem of the antiseptic management of wounds.

The bacteriological flora of war wounds has been definitely divided into aerobes, facultative anaerobes, and strict anaerobes. To the first belong the staphylococci, *B. pyocyaneus* and the colon group; whilst tetanus bacillus, bacillus of malignant oedema and *B. aerogenes capsulatus* belong to the second group. The bacteriologists have pointed out with a certain degree of assurance that there is a group of unknown organisms that play an indefinite part in the causation of gas gangrene.

The universal infection of wounds in this war and its tragic consequences are related in much detail.

The influence of *environment* as a factor in infection, as well as the infection of wounds of *modern armament*, the *source* of infection, the *influence* of the *sectional area* of the projectile and the influence of constitutional and local resistance among soldiers, are gone over carefully.

The question of poisoned wounds so nearly related to wound infection, and upon which the author has devoted much time in experiments and on published reports, is fully dealt with. The source of infection in typical tetanus so frequent in this country a few years ago, which was worked out by the author and others, affords interesting reading.

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In the fifth chapter, which deals with the general treatment of gunshot wounds, and in that part of it which is devoted to the treatment of septic wounds, we find a minute description of the new treatment of wounds by the application of hypochlorous acid, and the saline method as advocated by Sir A. E. Wright.

The preparation and use of hypochlorous acid as an antiseptic gas, developed by the action of boric acid on bleaching powder in the presence of a small quantity of water (Eupad), and the use of the same in the form of solution with a larger quantity of water (Eusol), are explained in detail. Carrel's modification of the above plan as described in the *Bulletin de l'Academie de Medecine*, T. lxxiv, No. 40, and his painstaking application of the method are also given.

The treatment of wounds by saline solutions, the idea of lymph lavage as explained by Wright, its value on badly infected wounds in the form of constant irrigation, continuous bath and salt soaks, as advocated by Col. H. M. W. Gray, R. A. M. C., as well as the open treatment of wounds and the treatment of wounds by excision and primary suture, are well described.

Another interesting feature of the new matter in this chapter is a description of the successful way in which the virulent infections have been combated in the world war. Tetanus and gas bacillus infections, which were so frequent and fatal in the early part of the war, seem now to be under comparatively good control by the use of tetanus antitoxin on the one hand, and liberal drainage aided by the hypochlorous acid and hypertonic salt solutions on the other.

The different forms of gangrene and the modern way of exploring gunshot wounds with bone involvement, are described in detail. For the after management of wounds, to prevent crippling, the author includes a copy of a memorandum which is placarded in the battle and hospital zones of Germany. Twelve commandments are enjoined in this important circular, full of valuable hints, and they should be heeded by all military surgeons.

The chapter on gunshot wounds of the head has received very important additions as a result of the wide experience recently obtained in Europe. This figures in operations of gunshot wounds of the head, to prevent infection and all of its ill effects, such as encephalitis, brain abscess and hernia cerebri. Probably the most important contribution on head wounds refers to injuries to the superior longitudinal sinus, which are so apt to occur from tangential shots by rifle bullets. Disturbances of the circulation in this sinus impair the flow of blood in the cerebral venous circulation which empties into the sinus. Striking clinical effects from blocking of the circulation in the superficial sinus have been noted. It is better not to operate too early in such cases, lest additional injury to the sinus should result. When operation is necessary, it is advisable to remove bone around the depressed area and only then selevate this, for, if hemorrhage occurs, the surgeon is in a more favorable position to control it.

To the chapter on gunshot injuries of the chest, valuable additions have been made, notably on the treatment of hemothorax. The view that the smaller hemothorax resolves itself without treatment is still true. It is only in the case of large affusion that persists or that becomes infected, that operation is in order. In sterile hemothorax when the fluid exceeds 20 to 30 ounces, or

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when the dullness reaches half way up to the scapula, the treatment is by aspiration on about the seventh to tenth day.

In infected hemothorax one should be on the alert for early recognition. Aspiration is not sufficient in this condition; removal of clot and pus is the only desirable resource and this is done by resecting a rib or two to insure thorough drainage.

Valuable data have been gathered in the present war upon the prognosis of hemothorax. Observations point again to the fact that hemothorax is one of the most common and, at times, one of the very serious complications of chest wounds. It is generally believed that such wounds in this war are accompanied by a hemothorax more frequently than heretofore; a fact which may be due to the increasing use of high explosive shells which break up into many irregular fragments, and also to the extensive use of machine gun fire, which sends forth pointed bullets with poor balance and a strong tendency to inflict larger wounds than those which normally occur when the bullet makes normal impact.

In chapter, nine devoted to gunshot wounds of the abdomen, we find that operative interference in this class of cases has been favored by many surgeons. Hitherto abdominal wounds in war had been dealt with in battle between mobile armies. Trench warfare, as conducted in the present war, in which the combatants occupy fixed positions, has made it possible to establish casualty clearing stations near the firing line. Thus the wounded may receive attention within a few hours after injury, under conditions where the surgeon is able to command environment, very much in the same way that civilian surgeons do in civil hospitals. The results under these circumstances pointed out by La Garde, lead to the hope that the military surgeon's statistics for laparotomy in war may yet approximate the good results noted by his civil confreres. He gives plenty of evidence to support his view.

In chapter ten, devoted to injuries to the blood vessels, etc., it appears that the experience of surgeons in the present war is rich in satisfactory management of all kinds of aneurisms, by the various methods of treatment. The value of vessel suture over ligature is well pointed out in 425 cases reported by forty-five different authors. Ligation was employed in 242 cases, while 182 were treated by vessel suture. Gangrene developed in 11.5 per cent of the former, necessitating amputation in every case. It developed in 3.7 per cent of the 182 cases treated by suture. Gangrene seems to be three times more frequent after the old method of ligature, and this should be practiced only in cases of severe sepsis or those in which operation is deemed necessary to save life, or in cases in which the collateral circulation is already established, rendering suture unnecessary.

Vessel suture should be undertaken only by experienced surgeons and, to those who are not experienced, the author recommends experimentation in this procedure as well as transplantation of veins in the lower animals.

In chapter twelve the author details minutely the method of treatment of gunshot fractures of long bones by the hypochlorous acid and saline solution. The value of the former, as pointed out, depends on the liberation of hypochlorous acid gas when the wound is treated with the powder Eupad. This powder is

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composed of bleaching powder and boric acid in equal parts, with a small quantity of water, as already referred to and here emphasized.[1] Eusol is the other form of hypochlorous preparation in use; this is the liquid preparation which is not so well adapted as the powder Eupad for use in those cases about to undergo transport. The great value of the method depends upon the power of the antiseptic and its comparative harmlessness to the tissue.

The doubtful practice of plating in compound comminuted infected fractures is reviewed at length. Although the method had advocates, the practice has not received much favor in recent cases. On account of deformity, or where nature has failed to provide the bone necessary for union, bone graft under strict asepsis, when the wound has entirely healed, is much preferred in military practice.

Chapter thirteen, on the casualties of battle, is new. The author details casualties of battle as one finds them in the older books on military surgery; then coming down to the casualties in the present war, he shows the difficulty of obtaining data of a correct nature during the progress of the war, since the interests of state often proclude such publication. Germany and England are the only nations that have given out information of losses and these have been but fragmentary. France has withheld all reference in published reports, but from certain censored information, newspaper and magazine reporters, attachés, etc., the author has gathered estimates of losses by the different armies that afford very interesting reading.

This important publication was written primarily to satisfy the requirements of a text-book in the Army Medical School at Washington. As gotten up originally, the needs of the general surgeon were considered in the preparation of the chapter on medico-legal phases of gunshot wounds; as well as in picturing the characteristic lesions of wounds by pistols and revolvers, injuries which are so common in the daily practice of the civil surgeon. These wounds are profusely illustrated in chapter two, the illustrations being gathered and text compiled after extensive experiments under orders of the War Department, with a view to ascertaining the stopping power of pistols and revolvers.

Now that the book has been brought up to date both in text and illustrations, with the new matter from the present war, we heartily congratulate the author upon having furnished the profession not only with a practical guide in the important subjects of his work, but upon having produced one of the best works on military surgery extant.

WALTER D. WEBB.

THE MAINTENANCE OF HEALTH IN THE TROPICS, by W. J. Simpson, C.M.G., M.D., F.R.C.P., Professor of Hygiene and Public Health, University of London, King's College, and Lecturer on Tropical Hygiene at the London School of Tropical Medicine. Published under the auspices of the London School of Tropical Medicine. New York: William Wood and Company, 1917.

Professor Simpson's little handbook on the maintenance of health in the tropics first appeared about eleven years ago.

[1] Certain further change has already developed in the formula for Dakins solution indicating its transitional stage.

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The present recent edition contains new chapters of Filariasis, Relapsing Fever and Insects, Trypanosomiasis, Malta Fever, Worms, Ancylostomiasis and Bilharziosis. There is not much change in the old matter.

The extreme precautions recommended against exposure to the direct sun's rays appears rather exaggerated to those who have dwelt a long time in the American tropical possessions, but are no doubt necessary in India.

Professor Simpson's approval of the wearing of woolen material next the skin for safety and comfort is certainly against American experience. The so-called cholera belt was extensively tried in the early period of our tropical service and was usually discarded on account of the irritation and relaxation of the skin which it caused.

The book is pleasantly written in popular style, and should be useful to the layman going to the tropics for the first time.

CHARLES F. MASON.

CARE OF PATIENTS UNDERGOING GYNECOLOGIC AND ABDOMINAL PROCEDURES, BEFORE, DURING, AND AFTER OPERATION, by E. E. Montgomery, M.D., Professor of Gynecology in Jefferson Medical College, Philadelphia. 12mo of 149 pages with 61 illustrations. Philadelphia and London: W. B. Saunders Company, 1916. Cloth, $1.25 net.

This small volume is the outgrowth of typewritten instructions by Doctor Montgomery for his assistants while convalescing from an operation.

The mention of many things important to the welfare, and particularly the comfort, of the patient after operation tells us immediately that "he has been there."

The book is intended for the interne, the nurse and the novice in the operating room; and the subject is dealt with in a "common-sense" manner; concisely and well.

Surprise is occasioned by the absence of mention of acute dilatation of the stomach as a post-operative complication; and of other procedure than cutting down on veins of arm for injection of saline intravenously.

The principal abdominal, pelvic and vaginal operations are very briefly described, the instruments for each and the preparation shown in accompanying illustrations, which are good.

WM. H. MONCRIEF.

SYPHILIS, by Loyd Thompson, Ph.B., M.D., Physician to the Syphilis Clinic, Government Free Bath House; Visiting Urologist to St. Joseph's Hospital; Consulting Pathologist to the Leo N. Levy Memorial Hospital, Hot Springs, Arkansas; First Lieutenant, Medical Reserve Corps, United States Army; Member of the American Urological Association and the American Association of Immunologists. Octavo, 415 pages, with 77 engravings and 7 colored plates. Cloth, $4.25, net. Philadelphia and New York: Lea & Febiger, 1916.

Since several months past, when we learned of Doctor Thompson's plans, we have looked forward with considerable interest to the appearance of this

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book. The result is in every way satisfactory and the author is to be congratulated upon the results of his labors. The volume contains a vast amount of information from which the chaff has been well eliminated; it is well illustrated and is presented in a readable and satisfactory manner.

It is intended, we take it, primarily for the general practitioner, but it will be of value to those who have paid more than passing interest to this disease. While all classifications of syphilodermata are open to more or less objection, that given by Doctor Thompson, in Chapter IV, has much to commend it and should serve as a satisfactory working basis. The dicussion which follows is very illuminating.

The chapter on complement fixation is a happy medium between the technical and long drawn out discussions for the laboratory worker and the short and unsatisfactory treatment of some of the older books. In this connection we are tempted to repeat one sentence which whether or not it be accepted *in toto*, is well worthy of thought: "And, finally, it should be reiterated that this reaction should be interpreted only in the light of clinical evidence."

The chapters on spinal fluid examination, prognosis, treatment, the involvement of special organs and tissues, and hereditary syphilis are also well worthy of mention.

One phase of the arrangement is specially satisfactory. Under the heading of the various tissues and organs, chapters are devoted to the different types of syphilitic manifestations which may be encountered therein.

M. A. REASONER.

LES FORMES ANORMALES DU TETANUS (Abnormal Forms of Tetanus) by Curtois-Suffit & Giroux. Preface by Professor Widal. Précis de Medicine et de Chirugic de Guerre. Masson & Cie, Editeurs. Collection Horizon.

This most interesting and valuable work considers a subject that was almost unknown up to the outbreak of the present European war. The earliest reports in the bulletin of the French Academy were soon followed by numerous other observations along the same line. These cases and others are considered in this work and every phase of the subject is fully covered.

Part 1 describes the better known forms of atypical tetanus.

Part 2, which comprises the greater part of the book, is given over to the study of "Partial Tetanus of the Extremities." The chapters are as follows; Chapter 1, Observations; 2, Historical; 3, Monoplegic Forms; 4, Paraplegic Forms; 5, Localized Tetanus of the Abdomino-Thoracic Type; 6, Abortive Forms with Slow Evolution and Prolonged Incubation; 7, Etiology and Pathology; 8, Evolution and Prognosis; 9, Treatment, Prophylactic, Curative; Conclusion, Bibliography.

It is unfortunate that this work is not available in English, as it adds so much to our knowledge of this subject. To those who read French it will well repay the time taken in its study.

GEO. A. SKINNER.

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"UNFIT GUARDSMEN."

Under the heading the *New York Tribune*, for January 28, 1917, reviews the report of Mayor Mitchell's Committee on National Defense. The rigorous language of the committee's report (composed as it is of well-known business men) lays it open to a severe reprimand from the higher powers, although this would not disturb the equanimity of the level-headed citizens whose names are appended to it. Stress is laid on the fact that no small proportion of the $2,000,000 spent for the mobilization and maintenance of the guard on the border was the loss represented in the previous training and equipment of men who were found to be useless when they were needed. The physical standards prescribed for the Regular Army, adopted by all but four States, were found to be "only on paper" 28,500, or 25 per cent of all the troops were rejected as physically unfit, though it is noted that in New York State only 5.7 per cent failed to pass. "The direct cause of this condition," says the report, "was the laxity in enforcing physical standards in the National Guard organizations in ordinary times of peace"—due to the difficulty of obtaining enough recruits to "maintain the minimum strength necessary to recognition by the Federal Government." The committee notes the lack of sufficient medical officers to make and record properly physical examinations, on which we have previously commented editorially. As we recall the hurried and superficial examinations made at armories and mobilization camps by overworked doctors, to many of whom the details were entirely new, we wonder why no effort was made to utilize many of the 2,000 officers of the Medical Reserve Corps, who were available in every part of the country.

The examination of recruits should be made an important feature in the training of the new officer's reserve corps (medical section), in view of a future "emergency" more serious than the one last summer. If *any* officer does not know how to examine recruits he should be sent to the nearest depot to learn not simply "on paper."

H. C. COE.

THE SOLDIER'S CATECHISM, by Maj. F. C. Bolles, 3d U. S. Infantry; Capt. E. C. Jones, Medical Corps, U. S. A.; and Capt. John S. Upham, 3d U. S. Infantry. Second edition revised. New York: Doubleday, Page & Company. 1916.

The authors state that their book is "not intended to supersede instruction . . . , but . . . to be used as an aid to the enlisted man in obtaining a better understanding of the subject when taken up by his instructors." Their experience in handling enlisted men render them well qualified to bring out a thoroughly practicable work. It is gratifying to the Medical Department that the authors realized the importance of First Aid to Wounds, Camp Sanitation and Personal Hygiene, and Venereal Diseases, to the individual man, and have allotted a commensurate amount of space to the treatment of these subjects. The answer to question 462 is erroneous. It would appear to have been better if the answer to question 843 had read—"Every officer and enlisted man in the Army," and in the answer to question 861, had such elementary instruc-

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tions been given as to the treatment of shock prior to the arrival of a medical officer. Taken as a whole, the book will prove a valuable addition to the Company library. It is well printed, of convenient size, and the photographic illustrations are good. The introduction is by Maj.-Gen. H. L. Scott, Chief of Staff.

W. L. HART.

REPRINT NO. 338 FROM THE PUBLIC HEALTH REPORTS FOR 1915 AND 1916, ENTITLED, "State Laws and Regulations Pertaining to Public Health, adopted during the year 1915."

This is a comprehensive volume giving the state laws and regulations adopted from June 1, 1911, to December 31, 1915, inclusive.

There is, naturally, considerable similarity in the requirements of the majority of the States concerning sanitary matters which are identical in all of them, such as birth, marriage and death records, control of communicable diseases abatement of nuisances, care of water supply, etc.

Beyond this, the individual States have further stringent laws to counteract sanitary dangers peculiar to their own environment.

It appears, after a perusal of this report, that the country in general has become thoroughly aroused to the fact that *prevention* is of greater importance than *correction* of sanitary evils and is the greatest factor in lowering the rates for sickness and mortality.

The various laws, as laid down in this volume, if rigidly complied with, would leave little more to be desired.

The next great step to be taken is to educate the masses up to the point of doing as they are by law required to do, cheerfully and with intelligence. Teach them why they should do thus and so. This is being steadily done, by means of object lessons, lantern-slide exhibits, lectures, literature, etc., throughout the country and, not least, the instruction of the children in the schools.

The abolishment of the common drinking cup and towel in public places is now an almost universal rule and alone will go far in restricting the spread of communicable diseases.

On the whole, it is very evident that there has been a vigorous awakening on the part of all the States, including our outlying possessions, Hawaii, Alaska, Porto Rico and the Philippine Islands, to the fact that proper sanitation is the prime factor in the preservation of the health of communities. This accounts for the rigid laws enacted, and, we hope, their rigid enforcement as well.

There are many improvements still desirable, but they will no doubt all come to pass in the near future

Eternal vigilance in sanitary matters is the price of safety to health.

GEORGE J. NEWGARDEN.

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CLINICAL NOTES

BASE HOSPITAL, No. 2, FORT BLISS, TEX.

Medical Officer of the Army:

Family and personal history.—Tropical service: Philippine Islands, 1909 to 1911; Mexico, 1916. Alcohol: Very moderate. Family history: Negative. Previous personal history: Malaria twenty-five years ago. Bilious fever in Philippine Islands, 1911 (probably dengue fever). Epigastric pain every few months for last three (3) years—did not last long. Many attacks of diarrhoea in Mexico—would last a week or two. Mucus in stools, but never noticed blood. Injuries: Left tibia, fractured in 1895. Venereal history: None.

History of present disease.—Onset November 20, 1916. Rather gradual onset. Had several attacks of pain, following this; pain was in epigastrium and did not radiate. Felt soreness over entire upper abdomen. Pain felt in back but not very severe. Attack would last about ten hours and then disappear. November 28, 1916: Had a severe attack of sudden onset. Noticed a slight fever during these attacks. No nausea or vomiting during time of attacks. Stools apparently normal. Last eight (8) months has lost about 100 pounds. Feels weak.

Subjective symptoms.—Slight temperature. Pain in epigastrium. Tenderness over right quadrant. Mass in upper quadrant visible on deep inspiration.

Objective symptoms.—Condition on admission: tenderness in epigastrium and upper right quadrant. Weight: 140 pounds, normal: 225. General condition: fair; patient weak. Special senses: normal. Skin and mucous membrane: no jaundice. Glandular system; vascular system; blood pressure; heart; lungs; genito-urinary system: negative. Abdomen: tenderness over entire upper abdomen, more marked in upper right quadrant. No localization of pains, but severe pain on pressure over gall bladder. Mass 3 by 4 inches long in upper right quadrant; moves on deep inspiration; is visible, smooth, firm and slightly tender on palpation. Leukocytosis, 16,800; polymorphonuclears 81 per cent. Diagnosis on transfer card: cholecystitis. December 5: stool positive for entemeba. December 10: stool positive for entameba. December 9, 1917: cholecystectomy and appendectomy. Ether. By Major Keller.

Progress.—January 18, 1917. Patient has progressed very favorably since his operation and the recovery has been uninterrupted and uneventful. He went on sick leave January 19, 1917, for one (1) month. The gall bladder when removed was opened under aseptic precautions and bile was examined by Major Creig, who reported entameba histolitica present. There were three stones found. With recovery from operation patient was given one 8 gr. course of emetine with bismuth-subnitrate. Amebae were not again found in the stool and it is believed that as they were so easily eradicated, the infection was in the gall bladder only and that operation was responsible for the disappearance of amebae from the stool. This opinion is substantiated by the

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fact that the patient has never had the usual clinical signs of entamebic dysentery. This case is submitted as one of amebic cholecystitis, which is understood to be very rare.

Laboratory reports.—Report on blood, December 16, 1916. Malaria not demonstrated: white corpuscles 16,800, small mono. 11, large mono. 5, trans. 3, polys. 81. White corp. 14,000, small mono. 23; trans. 1, polys. 73.

Report on feces, December 5, 1916. Ameba: plus. December 10: ameba: plus. The bile shows numerous degenerated entameba and also motile forms of *E. histolitica*, January 20, 1917. Three specimens sent in past ten days are negative for entameba.

Final diagnosis.—Cholecystitis, chronic, with cholelithiasis. (2) Appendicitis, catarrhal. (3) Dysentery entamebic, chronic. All in line of duty.

HOWARD H. JOHNSON,
Captain, Medical Corps, U. S. Army.

ITEMS OF NEWS

Information reaches us that the annual dinner given by members of the Medical Reserve Corps, U. S. Army, New York State Division, at the Hotel Savoy, New York City, tenth ult., was most successful in all respects, as might be expected under the presidency of Dr. Coe. The speeches by representatives of the various branches of the Medical Services, the profession and the public, afforded an unsurpassed feast of reason, while the material feast, we are told, was all that could be desired.

The attention of our members is invited to the fact that the New York State Division, M. R. C., U. S. Army, has determined to broaden the field of competitors for the Gorgas Medal in 1918 to include all those qualified to compete for the Wellcome Prizes.

We learn that recommendation has been made to detail, from the inactive Reserve, boards of medical officers for the examination of candidates for the Reserve. It is observed that these officers, assigned to active duty, are now quite generally being used for this purpose.

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THE MILITARY SURGEON

PUBLISHED BY THE
ASSOCIATION OF MILITARY SURGEONS
OF THE UNITED STATES
ARMY MEDICAL MUSEUM, WASHINGTON, D. C.

APRIL, 1917

VOL. XL NUMBER 4

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The Military Surgeon

Published monthly and constituting two volumes annually.
Volumes commence with the January and July numbers.

Entered as second-class matter January 22, 1916, in the Postoffice at Washington, D. C., under the Act of March 3, 1879.

Subscriptions $3.50 a year for the United States. Elsewhere throughout the world, $4.00. Single copies 40 cents. Subscriptions payable in advance. Checks should be made payable to the Association of Military Surgeons and not to any officer personally.

The addresses of members and subscribers are not changed except upon request. In every case the old as well as the new address should be given. Requests for change of address must reach the Secretary before the twentieth of the month to be effective for the following issue.

Original articles, items of news and matter of interest to the Services are welcomed. Requests for reprints should be made at the time of forwarding articles.

EDITED BY

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Medical Corps, U. S. Army

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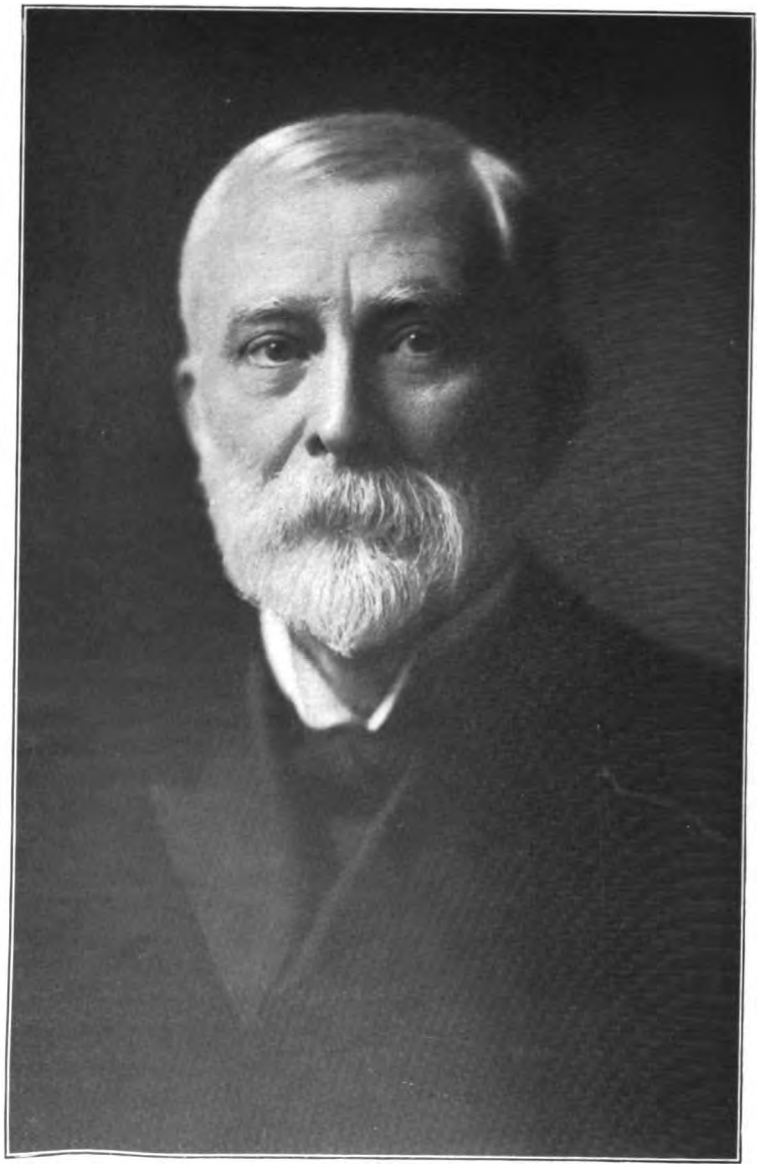

Sir Thomas Lauder Brunton, M. D., 1844-1916.

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THE
MILITARY SURGEON

VOL. XL APRIL, 1917 NUMBER 4

ORIGINAL ARTICLES

Authors alone are responsible for the opinions expressed in their contributions

SIR THOMAS LAUDER BRUNTON, M.D. (1844–1916) AN APOSTLE OF PREPAREDNESS

BY FIELDING H. GARRISON
First Lieutenant, O. R. C., U. S. Army

ON SEPTEMBER 16, 1916, Sir Thomas Lauder Brunton, consulting physician to St. Bartholomew's Hospital and one of the leading pharmacologists of recent times, died at his residence at De Walden Court, London, in the seventy-third year of his age. He was born at Bowdon, Roxburghshire, Scotland, on March 14, 1844, and received his education at the University of Edinburgh, where he took no less than four degrees and received many prizes, honors and gold medals. His graduating thesis in medicine on digitalis (1868) shows the natural bent of his mind, which was toward experimental pharmacology and the study of disorders of the circulatory system. In 1867–9 he studied at Vienna, Berlin, Amsterdam and Leipzig under such laboratory teachers as Brücke, Rosenthal, Traube, Willy Kühne and Carl Ludwig, and from Ludwig's laboratory, which he was one of the first to enter in 1869, he derived the main inspiration of his scientific life. During his long professional career as a London practitioner, he was known everywhere as a consultant in diseases of the heart and circulation. His books on "Pharmacology, Materia Medica and Therapeutics" (1885), "Disorders of Digestion" (1886), "Lectures on the Action of Medicine" (1897), "Disorders of Assimilation" (1901), have been widely read and studied. His natural field was the circulation. Employing the sphygmograph, he was the first to ascertain the rise of blood pressure in angina pectoris (1867), and in the same year introduced amyl nitrite as a remedy for the condition. In 1874 he attempted to obtain a glycolytic enzyme from muscle in the hope of enabling diabetics to utilize the sugar in their own blood, and actually administered raw muscle extracts to diabetics at St. Bartholomew's—an early experiment in opotherapy. He aimed to practise medicine physiologically, and was a resourceful therapeutist. Personally he was a man of kindly,

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generous, sagacious nature, with a quaint, pawky vein of humor, which endeared him to his many friends. With the late Col. John S. Billings, Librarian of the Surgeon General's Office during 1865–95, Brunton was on terms of unusual intimacy and their private correspondence was extensive. To the Surgeon General's library he made gifts of the most munificent character, including over 400 volumes of physiological and pharmacological memoirs bound and carefully indexed by himself, containing everything worth having in these sciences during the fifty years of his scientific activity, and a unique collection of photographs of the pupils of Carl Ludwig. To the present writer he made many friendly gifts. He entered your life, apparently to enter into controversy with you, after the Scotch fashion, but in reality to shower benefits upon you. He was that kind of a man.

The editor of THE MILITARY SURGEON, which for years has advocated the cause of medical preparedness, has asked the writer to give some account of Brunton's remarkable volume of essays on physical and military training, a subject which occupied him during the last seventeen years of his life.

The volume consists of thirty-four essays and tracts, written during the years 1898–1915. Brunton's interest in physical and military training was stimulated by a visit of his friend, Prof. Angelo Mosso, the Turin physiologist, who came to England, at the request of Queen Margherita, to investigate physical training in girls' schools and conditions of fatigue in occupations requiring great exertion. A letter which Brunton wrote to *The Times* on the needs for defense of the country went, he says, "into the editor's waste-paper basket." Thereupon he got in touch with the military men, and, with Colonel Pennington, one of his patients, drafted a scheme for military training in schools. At a dinner at the Reform Club in 1902, the subject was discussed in detail by a number of public men. It was decided that the cause of military training in schools "in the present temper of the country" was hopeless, and that "the only possible thing was to try for physical training." In letters to the *Lancet* of February, 1903, and the *Manchester Guardian* of April 2, 1903, Brunton proposed the appointment of a commission to investigate the subject of physical degeneration. "Had the risks which I then pointed out been recognized," he says, "had the course I then advocated been adopted, our position in regard to this present war would have been very different." Soon after, however, at the instance of Sir William Taylor, an Inter-departmental Committee to investigate the causes of physical degeneration was appointed, and in order to secure an agency to carry out the reforms which might be recommended by the committee, Brunton took steps

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to organize a National League, which, however, was not formally inaugurated until June 28, 1905. The thirty-four papers mentioned reveal the extent to which Brunton labored for this movement, in aid of which he worked for the most part single-handed, paying expenses out of his own pocket. The league extended the scope of its activities to such subjects as the prevention of infant mortality and the conservation of life, but, to the last, Brunton, the apostle of the cause, remained as one preaching to the desert, although he was one of the most popular consultants in London, an engaging writer and an effective speaker. Why was this? Anglo-Saxon conservatism, some will say, or perhaps apathetic indifference to science, indifference to hobby-riding, or what not. In the opinion of the present writer, Brunton vitiated the force of his argument by riding a special hobby of his own, which was not physical and military preparedness but a negligible phase of it, viz., the infusion of military spirit into small boys at school. He is everywhere a sensible, reasonable and convincing advocate except on this one point. Nowhere does he indulge in any vituperation or censure of the Germans, among whom he had lived and studied. To censure Germany *en masse* would have seemed to him as unthinkable as to censure France under Napoleon I. He saw historical events as fatalistic, inevitable occurrences, sweeping nations and the individuals composing them along, as sands are shifted by the waves of the sea—very much as a good mathematician sees physical happenings as the resultants of sets of initial conditions. In an ideal or millennial world, the initial conditions might be changed perhaps, but where they exist, the manful thing is not to chide about them, but to deal with them. Like the continental Europeans, he saw clearly that storm was brewing, and that his own country was not popular at the time he began to write on preparedness. In 1903, he inferred "the not impossible event of a coalition of France, Russia and Germany against isolated Britain," an inference which shows how little can be reckoned with the permanence of national alliances. In his earlier propagandism for preparedness, his favorite device seems to have been to infuse military spirit into schoolboys from the start by "the childish games 'I spy,' 'French and English,' and 'Prisoner's Base,' which are old war games of scouting, capture, and recapture," adapting these "to the necessities of modern warfare," the children to play with toy guns and percussion caps, while older boys were to have close ordered drills, firing exercises, skirmishing, estimation of ranges, scouting and shooting. At the time Brunton wrote, when boy scouts were not, all this must have seemed inept and puerile. In the United States such a plan would soon have defeated its own object, for self-evident reasons. It is always wiser not to inter-

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fere with nature—to leave children to childhood's devices. The advantages of dragging them into military affairs *en masse* are in themselves ludicrously uncertain. Even in monarchical countries, the success of preparedness depends, in the last analysis, upon the spontaneous manful volition and patriotism of those who have attained to actual physical manhood. With these reservations, we may now consider the most valuable part of Brunton's book.

From the viewpoint of military medicine, the best of these essays are those concerned with the physiology of exercise and over-exercise, training and work. Here Brunton, one of the best modern authorities on the circulation, is on his own ground. He saw clearly that overtraining and over-exertion, at the start, would result in great numbers of cardiac defectives, and thus create unpreparedness by rendering preparedness unpopular. This fact, well known to trainers of oarsmen and other athletes who have "gone stale," and as common to outdoor sanitaria for intensive exercise as to the rigors of trench warfare, is of great importance to military men. The first essay in the volume, the address on "Exercise and Over-Exercise," is the most important one for the trainer of recruits. Brunton shows, from the experiments of Mosso and Kronecker, that digestion, severe mental exertion and bodily exercise are more or less incompatible, one with the other; that exercise which puts in action every muscle of the body is more beneficial than prolonged exercise of isolated sets of muscles; that the poisonous products formed by over-exertion of the muscles cause them to diminish in size and power, impair respiration, strain, dilate and weaken the heart, impair mentality, destroy the appetite and render the individual more liable to disease and death. As the muscles become trained, these poisonous products diminish in quantity, until the person becomes hardened to fatigue. Fatigue, says Brunton, is a complex thing, "partly due to the state of the muscle which causes it and partly to the state of the brain which perceives it." Mental exertion and anxiety will make the muscles more easily fatigued. Mental fatigue causes bodily exhaustion. The inference is that intensive training of miscellaneous groups of men in military camps should be carefully graduated from the start, that, where time presses, large groups of men should be classified according to their relative stamina, and that the exercises should be designed to put many muscles into action by alternate contraction and relaxation of different sets, in order to get maximal results and avoid the possible production of neurasthenics, myasthenics and cardiac defectives, since these people are liable to denounce the whole scheme of training when they leave camp. This end is very admirably attained in the different setting-up exercises, but in marching exercises and "hikes" at the start, the case is different. In summer training camps

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of short duration, it is of doubtful advantage to mix up intensive physical training with courses of closely reasoned lectures, requiring the taking of notes. For student officers, lecture courses with note-taking seem most profitable indoors during autumn and winter nights. The short summer courses could be concentered mainly upon the *Abhärtung* process and practical open-air exercises. Listening to lectures after a hearty meal, in an open tent, with the summer breeze blowing, the men drowse and loll over their note-books, are not at home mentally, and even fall asleep. Brisk, stimulating practical extempore talks, with occasional quizzing, contributed to make the Plattsburg idea a success. In the case of long distance hikes by raw recruits, Brunton's Alpine citation (from Baedeker) that "travelers are advised to eat something every two hours to avoid fatigue," is well worthy of attention. Snacks of food at short intervals are a feature of the long voyages of the Pacific mail steamers, where the travelers do a vast amount of walking on deck. Francis Galton recommended bunches of raisins to long distance trampers and the advantages of a cake of sweet chocolate are well known. German Army Corps have gone through maneuvers on an experimental sugar diet. The seasoned man may regard all this as feather-bed soldiering, but the object is not merely the survival of the fittest but to secure the ultimate fitness of the greatest number, and of these many are "tired business men" or youths who may not have attained full physical maturity. Brunton concludes:

"Years ago I thought it was impossible to have too much of a good thing, and in the self-sufficiency of youth I was inclined to regard Solomon as somewhat foolish when he said, 'Be not righteous overmuch, neither make thyself over-wise, why shouldst thou destroy thyself?' The advance of years has taught me better, and I now acknowledge the wisdom of Solomon, and venture to apply his dictum to the body as well as the mind, and advise my medical brethren as well as those who have the charge of youth, to take care that they shall neither try to make those who are under their care over-wise or over-strong, either by undue exertion of mind, of body, or of both."

Of exercise in general he says:

"In discussing physical training with a learned German professor who is himself a great athlete, he expressed the opinion that the systems of physical training in Germany and in England were both one-sided, and that a correct system ought to combine the two. The German training in a gymnasium tends to develop the muscles and increase the strength of the body equally in all its parts, whilst cricket and football tend to develop the muscles of the legs in excess of those of the arms and upper part of the body. But, on the other hand, games of ball, such as cricket, develop the nerve-centers which coördinate complex movements, and make the eye, hand, and foot all work harmoniously together for a common end in a way that gymnastic exercises fail to do."

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Of the enlisted man as a future skilled laborer and wage-earner, he gives a good example from the Russian Army:

"A Russian peasant or workman upon the completion of his military service can nearly always command from 25 to 50 per cent higher wages than those who have not had this advantage. . . . Only a very small part of the multifarious requirements of the Russian army and navy could hitherto be supplied by private industry. . . . The Government has been compelled in almost every branch to take the initiative from the weaving of cloth for the soldiers' uniforms to the making of common or scientific instruments. In the army almost every trade is carried on and rarely does a recruit return home when his military service is over without having gained some technical knowledge that greatly increases the value of his labor."[1]

Of the bogie of "militarism" in democratic countries, he saw that your city gunman is more dangerous to society at large than the frontiersman or the disciplined soldier:

"Could any peoples be freer from this than the American settlers, who less than a century and a half ago defeated the British, or the Boers, who but for our great numerical superiority might have done the same today? Both the Americans and the Boers had been from childhood trained up in the use of the rifle and in scouting in their conflicts with the wild beasts or with wilder men."

His argument for preparedness is the common-sense one:

"We know that at school the small boy is liable to be attacked, however inoffensive he may be, while the boy who is able to thrash any of the others is left alone and may live in peace as much as he likes. This strength does not necessarily render him a bully, and a condition of being perfectly prepared to defend ourselves would not render us aggressive. And surely it is as much every citizen's duty to be able, in case of need, to defend himself, his family, and his country as that he should know the 'three R's.'"

One argument against his cause he disposes of like a canny whist player who quietly trims his adversaries of their trumps without their knowing it:

"Mr. John Burns is quite right in thinking that physical training will not do everything to restore the deteriorated physique of the nation. As he very truly says, 'The fathers must drink less alcohol and the mothers less tea,' and the food and surroundings of the child must be improved from birth onwards. But the boys and girls who are now at school will be fathers and mothers of the next generation, and if by physical training we can increase their strength they will not have the same craving for alcohol and tea, and they will have more inclination for exercise. They will be able to earn better wages and they will

[1] F. H. E. Palmer: Russian Life in Town and Country, London, 1901, p. 260.

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be able to give their children better food than they have had themselves; and in two or three generations we may hope to find the standard of English physique again rising to its proper height."

His final argument for physical preparedness is conclusive enough:

"The invasion of Germany by the armies of Napoleon the First taught the necessity for the universal service which enabled her to inflict upon France such a crushing defeat under Napoleon the Third. We hope that compulsory service may not become necessary in England but *if we are to avoid conscription* we must take measures to raise the physical standard of that class from which our recruits are drawn."

These are fair examples of Sir Lauder Brunton's propagandism for physical preparedness in England. Cogent, unbiased, reasonable as they are, they fell upon deaf ears, and he was destined to pay part of the terrible price of his country's indifference. His son was killed in France, his wife died shortly after, and he himself, broken in health, turned his face to the wall and died, "his soul well knit," but "the light of his life as if gone out."

In the United States the question of preparedness and universal military training is much discussed, but, as Colonel Munson has said, the sacred fire is lacking. We are essentially a business people, desirous of maintaining friendly relations and doing business with other nations. Even our ornate public buildings, Lowell said, "look as if they mean business every one of them." Religion and trade, Emerson thought, were the leading motives of American civilization from its inception. In no sense are we a military nation, nor is there any particular danger that we will be. Under present conditions of world warfare, we are a peaceful, friendly and, up to that point, a defenseless nation. Anthropologists say that we are suffering from a bad attack of feminism. But there is no lack of vigor and manliness in our athletic youth, and our moral flabbiness has been due to another cause. The soldier, the sailor, the athlete, the frontiersman, the explorer, even the natural boy, is so far not either a bourgeois or a Philistine, a carpet-knight or a *Pantouffelheld*. Much as the American *de race* may affect to despise middle-class standards, we are, in our present phase, more like the type described by Joubert:

"The character of the true bourgeois is to be the peaceful and idle possessor of what he has; he is always pleased with himself, and easily pleased with other people."

But the history of any nation goes to show that the only people in it who have amounted to much, those who have striven to be of some honor to their country, are not its self-satisfied parasites, but the aspir-

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ing people who have shouldered the world's burdens and worked for some other motive than "what there is in it" for them. The humorous, business American, who overworks himself up to nervous breakdown or overeats up to pursy, lazy provinciality, does not like to be dragged away from his comfortable home and creature comforts to perform military exercises in the open air. But we proverbially "sit as many dangers as we run," and Thoreau has observed that men may sit in chambers, "seemingly safe and sound," and yet be naught but Dead Sea apples. The man who wrote the lines above, Joubert, Matthew Arnold's particular "child of light," was an invalid and a recluse, to whom, however, Napoleon came when he wanted a councillor for his university, for he knew that he was going to the finest intelligence in France. And Joubert also wrote: "After a soldier's life, nothing is fine but study or piety." Carlyle cites the utterance of Jean Paul's timid home-body to his wife, who had got him out of a tight place: "Thou lioness! would that I might reveal to thee the lion which is concealed in thy husband!"

Brunton, as we have seen, was early compelled to relinquish the project of military preparedness and concentrate his efforts upon physical preparedness; but, apart from the indifference he encountered on all sides, there were excellent reasons for this. Military preparedness is essentially a problem for military men, a matter of general staff administration, including the perfection of instruments and mechanisms of precision. But once arrangements for recruiting have been secured for the general staff, the thing is not only to get the men, but to get them hardened physically for military duty. Here the problem of physical preparedness becomes a physician's problem, and the interest of Brunton's propagandism lies in the sagacious way in which the subject was approached and handled by a master of physiology. He found his best arguments in the splendid systems of physical training of Sweden and Switzerland. By preparedness, the Swiss republic has been able to maintain its autonomy and to protect itself from invasion in the present war, an example to all democratic countries. But over and above the positive merits of the Swiss system of open-air calisthenics, their voluntary army service for preparedness is found to be associated with a spontaneous feeling of personal pride and patriotism. To be accepted for voluntary military training is regarded as an honor rather than as a burdensome obligation, being, in effect, a public guarantee and certificate of physical and moral manhood. As with most of the European military establishments, only about 75 per cent of the available Swiss male population are found to be physically fit for military service, and of these, when the budget for training expenses is low,

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only the best are accepted, all the others paying a small tax to make up the deficiency. In the Romance languages (French, Italian, Spanish), the word "disgrace" is synonymous with "misfortune." In Switzerland, not to be accepted as a volunteer is regarded literally as a disgrace, in both senses. As Major Huntington has said, "To be enlisted is not a right but a privilege." At a time when little children are being taught to respect "our country's flag," adult citizenship has so cheapened that many grown-up able-bodied men seem to regard their citizenship as a sort of honor conferred upon the country, with no further obligation on their part. Surely training for preparedness ought to enhance the feeling that it is an honor and a privilege to be a citizen of the United States, and no price is too great to pay for it.

It is an axiom of military medicine that "a vicious man is never an athlete; an athlete is seldom anything but a well-conducted man." In the ancient sense of Greek medicine, Brunton saw physical preparedness as an apotropaic ritual, something designed to avert rather than to court disgrace (misfortune) and disaster. Preparedness means preparation for peace as well as for war—*in utrumque paratus*. His kindly vision, the vision of a wise and experienced physician, saw in preparedness the possibility of better husbands for the girls, better fathers for the children, better providers for the family, more seasoned, hardened, well-knit, well-disciplined, dependable, reliable men as citizens of the nation. His message to his country, or indeed to any country which desires to maintain the peace of the world with equity, integrity and dignity, was the old scriptural precept: "Quit yourselves like men: be strong."

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MENTAL AND PHYSICAL ACTIVITY WITH REFERENCE TO NUTRITION AND BLOOD PRESSURE

By P. A. Surgeon R. G. HEINER, U. S. Navy
Department of Naval Hygiene and Physiology, United States Naval Academy

THE stimulating effect of light exercise produces an increase of circulation over the entire body, and, if not violent enough to call to the muscles the blood needed at other parts, will cause increased activity in all the organs; hence light exercise after a normal meal will aid digestion.

Exercising right after meals acts on the digestive organs and heart as follows: The exercise will cause a general quickening in the circulation, which will supply more blood to the digestive apparatus, consequently more food will be digested; more food digested, increased heart's action; and so on. Under ordinary conditions of life this is a very good state; but where you have excessive work to do this will form a vicious circle, as it were, and cause rise in blood pressure with heart strain, nephritis, hardening of the arteries, etc.

By exercising directly after meals, at first lightly and then a little more heavily after each succeeding meal until after a week or so violent exercise be taken after each meal, the blood pressure can be teased up, so to speak, to quite high above normal, and the physical and mental activities will be thereby greatly increased. This can be done also with stimulants after each meal. Any violent strain or the missing of a meal during this process will cause a break in this circle, and there will be a fall in blood pressure and the temporary symptoms that go with it. A man living in this state may be able to do an abnormal amount of mental and physical work; but he is burning the candle at both ends, and there is a great strain on his circulatory and excretory systems, and any break in his regular food supply before each working period will cause a break in his food stimulation, so to speak, and he will have a fall in blood pressure and a period of depression, which will perhaps cause him to be more susceptible to disease for a few days until his system has readjusted itself.

An example of this is the busy man of today who eats a hurried breakfast, runs for the train and takes no rest either before or after lunch, comes home and probably works after dinner at night. Part of his coming trouble will of course be due to bolting his food, but the principal cause will be over-strain due to working all of his organs at the same time and at full speed.

Two things may happen to a man living under such conditions:

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1. The digestive tract is deprived of its blood supply and fails to perform its function. In this way the vicious circle is broken and there is no rise in blood pressure and no extra strain on the heart, kidneys or arterial system except what may be caused by toxins absorbed from the fermenting food in the digestive tract. The stomach has to bear the brunt and there will be gastritis and dilatation, or the gastro-intestinal tract may relieve itself by vomiting or diarrhea.

2. The digestive organs get their blood supply, form their secretions, and digest the food; a rise in blood pressure occurs, and for a few years the subject is more active and apparently more healthy than the average, but there is bound to be a break some time.

Most of the hygienists of today agree that during a period of excessive strain, either mental or physical, it is better to cut down on the diet, even at the expense of the body tissue. That is, lose weight, which will be quickly regained at a time when energy can be spared for the digestive process.

Chittenden says that:

"It is a mistake to assume the necessity for a hearty meal because heavy work is about to be done. It is certainly far more rational from a physiological standpoint to leave the hearty meal until the day's work is accomplished.

"We seemingly forget that the energy of muscular contraction comes not from the foodstuffs present at the time in the stomach and intestinal tract, but rather from the absorbed material stored up in the muscles and which was digested and absorbed a day or two before. Further, it is to be remembered that the very process of digestion draws to the gastro-intestinal tract a large supply of blood, and that a large amount of energy is needed for the process of secretion, digestion, absorption, and peristalsis, which are of necessity incited by the presence of food in the stomach and intestines, thereby actually diminishing the amount of energy available at the place where it is most needed.

"Why, then, draw upon the resources of the body just at a time, or slightly prior to the time, when the work we desire to perform, either muscular or mental, calls for a copious blood supply in muscle or brain, and when all available energy is needed for the task that is to be accomplished.

"We are wont to compare the working body with a machine, the boiler, engine, etc., overlooking the fact that the animal mechanism differs from the machine in at least one important respect. When we desire to set machinery in operation we must get up steam, and so a fire is started under the boiler and steam is generated in proportion as fuel is burned. The source of energy made use of in moving the machinery is the extraneous combustible material introduced into the fire-box, but the energy of muscular contraction, for example, comes not from the oxidizable food material in the stomach, but from the material of the muscle itself. In other words, in the animal body it is a part of the tissue framework that is burned up, and the ability to endure continued muscular strain depends upon the nutritive condition of the muscle involved, and not upon the amount of food contained in, or introduced into the stomach."

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It seems that in the developmental period all animals require frequent and regular feedings; and this is more or less the case throughout the whole life of herbivorous animals, but the carnivora and also those animals in a class between the herbivorous and carnivorous animals, after full growth, are able to stand it and really thrive, where periods of starvation are alternated with periods of feeding.

Carbohydrate digestion is a much simpler process than proteid digestion and requires less expenditure of tissue and energy, which is probably the reason for the herbivorous animals being able to carry on digestion at the same time that they are active, as their food is mostly carbohydrate, while the carnivora, whose diet is principally protein, require or at least prefer rest after feeding. In other words, after a protein diet, which requires the most marked increase of blood supply to the organs of digestion in order for them to form and secrete enzymes, the state of the body should be such as to encourage this increase of blood supply. No mental or physical exertion should be indulged in, and sleep should be encouraged.

Before commencing a hard mental or physical task, digestion should have been completed, and nothing but carbohydrate food, or no food at all, taken until the work is done.

I can find nothing published to the effect that any experiments have ever been conducted to show that a man with a large amount of work to do, either mental or physical, can do that work more efficiently and with less strain on his constitution, if he refrains from all food during the time he is working. Nevertheless, I have a theory as to this, which I have proven to my own satisfaction by experiments conducted at random over a period of many years. As I have been unable to carry out consecutive tests in a scientific manner I will not attempt to set them down, but I will give an outline of how such tests should be conducted.

The theory is: For a period of five or six days a man can be more active mentally and physically, endure more hardship and suffer less ill effects from the same, without any food, than a man on full ration for the same period. It will require three days for a man on no diet to re-nourish himself back to the condition he was in before he started, and he will have to have absolute rest during these three days, but he will be able to do more in the six days starvation period than the man on full ration can do in six days, plus three days. Further, these periods of six days starvation and three days on triple ration can be kept up for an indefinite period, in the normal healthy adult, with not only no ill effects, but with decided gain in bodily strength and vigor. A period in which only easily digested carbohydrates are taken can be substituted for the starvation periods with nearly equal results.

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If a man used to three full meals each day starves himself for six days the following facts present themselves:

For the first ten or twenty hours there is a marked fall in blood pressure with symptoms of intense hunger, faintness, dizziness and headache and even fainting. These symptoms, except hunger, will be slight in the average normal man. After this there is a loss of appetite, which will last five or six days or longer. The blood pressure rises to normal and there is a marked increase in nervous and muscular energy. There is insomnia, and a man can work for sixteen hours out of twenty-four. Strength tests will show greater than normal, and endurance will be greatly increased.

When food is started at the end of six days a bowl of soup or glass of milk will satisfy the hunger, and it is all that should be given. After this the man will sleep soundly for several hours, and on awakening will have a strong appetite. A good well-balanced meal can now be given him, and he will want to sleep again after eating it. At the end of twenty-four hours he will have a ravenous appetite and will from now on eat heartily and sleep soundly for the two or three days rest period. The amount of weight lost during six days starvation varies according to the amount of work done, but this will be regained during the rest period, and after being regained another period of work and starvation can be begun. There will be slight, if any, disagreeable symptoms at the start, as at the start of the first period.

The advantage of this method of nutrition under excessive strain, as long marches, long watches, etc., is—the man will be wider awake and more active, he will be living under low blood pressure, and there will be no strain on his vital organs.

Children should never be subjected to starvation, and this is not a method for ordinary life.

Certain Indian tribes were noted for their endurance; and it is known that they lived a life of privation and hardship with alternate periods of starvation and plenty.

I have questioned many men who have had opportunity, or rather who have by force of circumstances been required to be intensely active, both mentally and physically, for periods in which no food has been taken, and they all say that no ill effects could be noted.

In certain parts of the West Indies, natives take trips covering periods of continuous travel for twenty-four or more hours, during which time they take no nourishment except coffee sweetened with sugar. They say that without food they suffer less from fatigue, and that there are fewer disagreeable after effects.

There are great advantages, under certain conditions, in this method of nutrition, both in civil and military life.

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In civil life the working man's greatest loss of time and greatest discomfort is getting to and from his work. It forces him to choose expensive and uncomfortable quarters in order to be near at hand.

What if a man would work sixteen hours a day for six days, taking a very light carbohydrate diet of sweetened coffee, and perhaps a little bread, which he could have furnished at a near by coffee-house, and resting in a common sitting room furnished by the employer, during the hours between shifts? He would have accomplished two weeks work in six days, saved the time taken for eleven round trips to his home, and would have the next eight days to himself for resting, renourishing his body and amusement. Further, he would not have to consider proximity to his work in selecting a home, as he would only have to make two round trips a month. It would be possible for him to live far out in the country and use a part of his eight days off duty in cultivating the land, building a home, or in amusement.

What of the long hours necessary in running railroads, and the wasted time getting to and waiting for transportation to get to home? I have often questioned railroad employes; and the hardest thing they have to contend with, it seems to me, is the wasted time and discomfort connected with being left far from home in an out of the way place at the end of their shift. Of course it is impossible for the company to finish them up each day at their homes, but this would not make much difference if it only occurred two or three times a month. If a man would work for six days almost continuously and on little and simple and easily carried food, snatching his rest at such times as he could, he would do this and deliver the same amount of work in six days as ordinarily is given in twelve. He would be entitled to his eight days off, and if he could do this and retain his health and strength; in certain occupations, he would save himself a large amount of time, discomfort, and expense. The time he would save he could use to better his condition as regards education, etc.

No one who has a pleasant occupation with comfortable surroundings could be induced to take up such a method of living as I have just described, and he would be foolish to do so; but I am sure that with the inducements, which could be fairly and without loss to the employer, offered, many men who are working under bad conditions, as to transportation to and from work and inability to get suitable or cheap quarters, would be willing to try this method; and having found it a help would be grateful.

There can be no question as to the military value of a method of nutrition whereby long marches can be taken covering periods of several days during which elaborate meals do not have to be cooked. In many cases it would eliminate the carrying of much food and the

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utensils necessary for cooking, as where a body of men is to be moved from one established camp to another not over three or four days marching distance apart.

In the Navy under certain conditions, as in submarines, for instance, it would be an advantage to furnish previously prepared carbohydrate food, such as sweetened coffee, biscuits, etc., over a period where there is a need of being ready for sudden emergencies, and, after the emergency has passed, get out of the way somewhere for a day or two, and rest and nourish the body with full rations.

Fletcher has proven that if we eat the kind and amount of food we desire and thoroughly masticate it, allowing time to taste and enjoy it, the body will soon attain a nutritional equilibrium and there will be no undigested food left over in the intestines to putrify and cause auto-intoxication. Fletcher's method of nutrition is undoubtedly ideal for the average individual, especially those with sedentary occupations; and if we could all lead a regular life and take what time we pleased to our meals it would be suited to all classes.

There are certain functional disorders and chronic infectious diseases for which the rational method of treatment consists in building up the tissues, and one of the common methods used to accomplish this result is forced feeding.

Forced feeding given with no reference to exercise and stimulants will often fail; but if given with reference to exercise or stimulation, as follows, will bring prompt results in many cases:

In trying out this method of forced feeding the exercise prescribed must commence right after the meal, and should be strenuous in direct proportion to the size of the meal.

At first it should be fairly light, as a brisk walk of one hour's duration.

The exercise after the first meal of the day (breakfast) should be rather light, and that after the evening meal most heavy, especially if the dinner is made the last meal of the day.

When stimulants are given in lieu of exercise, as to bed patients, they should be given right after meals, and in amount directly in proportion to the size of the meal. The patient should be kept awake, and if possible made to sit up in bed after meals. After the patient is strong enough, exercise should take the place of stimulants.

Exercise or stimulation should be diminished if nausea or labored heart's action appear.

The best stimulant is strong coffee, which can be given in increasing amounts.

This method may be found of advantage in the forced feeding of tuberculosis cases.

If a man exercises after meals in this manner for about a week

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or ten days, he will gain several pounds. He has an increasing desire to sleep after eating, which he has to overcome in order to carry out this method of feeding. At the end of ten days, if he starts out on an empty stomach, that is, reversing the manner of exercising and feeding, he will feel very alert; and active exercise will be enjoyed for a few hours; then an intense hunger and fatigue will develop; and if he eats a big meal he will sleep for several hours afterwards and awaken feeling uncomfortable; perhaps sick. This is the way you feel after sleeping following your Sunday mid-day dinner. You have been under forced feeding all week; Sunday morning you take a walk to develop an appetite and you feel fine; you eat a hearty dinner, and afterwards fall asleep, and the result makes you say sleeping after dinner is bad for you, but it is simply that during the week you have been over-eating and active—a sort of forced feeding. Sunday morning you have a light breakfast and take exercise in the form of a walk; there is a fall in blood pressure, or a break in the circle formed by eating and activity, which I spoke of in the first part of this article. The only way in which you can avoid the uncomfortable feeling is to keep the blood pressure teased up by exercising after your dinner. We should not be forcing ourselves by eating more than we want. The Fletcherizer would not have the foregoing experience.

Where an occupation requires a man to be active at uncertain times, he may have to do heavy work right after a large meal and later be intensely active on an empty stomach. Heavy work after a meal will either cause an increase in blood pressure or disturb digestion. Heavy work on an empty stomach where a meal hour comes right afterwards and the subject eats heartily will cause a disturbance of digestion. To quote from How to Live by Fisher and Fisk: "Which meal in the day should be heavy and which should be light depends largely on one's daily program of work, the aim being to avoid heavy meals just before heavy work. When very tired it is sometimes advisable to skip a meal or to eat only lightly, as of fruits and salads. A man who eats heartily when he is very tired is likely to be troubled afterward with indigestion."

When bodies of men have certain irregular and arduous work to do it is best to divide them into two shifts in such a way that one shift will do all the work continuously for three or four days while the other shift is resting; the shift on watch taking no food or very light carbohydrate food, and each man working for two eight-hour periods out of twenty-four hours with two four-hour rest periods between them. The shift off watch is not called on to do anything and receives a very liberal diet.

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The facts which I wish to bring out in this article are:

First.—That exercise after meals raises the blood pressure and that activity, either mental or physical, after eating with the warding off of any inclination to sleep soon after meals, if continued over a period of several days will heighten blood pressure considerably. This heightened blood pressure compensates for the need of extra circulation in order to supply the brain, muscles and digestive tract all at the same time. When the blood pressure is raised by this method of living the missing of a meal or sleeping after a meal will cause a fall in blood pressure, and, in the case where sleeping after a meal occurs, there will be a lack of blood for the digestive organs and consequent failure in digestion with disagreeable symptoms on awakening.

Second.—When the heart, kidneys and digestive organs are sound, but some part of the body, as the lungs, is being destroyed by a chronic infection, as tuberculosis, which an increase of circulation will benefit, forced feeding carried out by exercise or stimulation after meals will give better results than forced feeding given without regard to time of exercise or stimulants.

Third.—Living without food for a few days is not as unpleasant an experience as one would be led to believe by the symptoms of faintness and intense hunger which come on during the first few hours; for these not only pass away entirely, but there is a feeling of well being and desire to be active, and, as I stated before, at the beginning of the second period of starvation there will be little if any of the disagreeable symptoms experienced at the start of the first period.

Where these periods of starvation and activity followed by feeding, rest, and sleep are carried out you will get practically the same benefit as from Fletcher's method. During the starvation period practically everything is digested and absorbed from the alimentary tract and the digestive organs come to rest. During the rest and feeding period all the energies of the system are used in the process of digestion, and there will be very little of the food left undigested to putrify and cause auto-intoxication.

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CIVIL PHYSICIANS AND NATIONAL DEFENSE

By Lieutenant Colonel HENRY PAGE
Medical Corps, United States Army

IF we believe that this great country of ours is something more than that which dollars and cents can buy; if we hallow the memory of our fathers' spirit which lives in our institutions; if you feel that the Stars and Stripes represent something sacred, something worth preserving, something to die for; then, my countrymen, the message is that you must individually and voluntarily accept the responsibility of protecting your heritage.

Between monarchy and democracy there is but one broad distinction. In the former the responsibility for the preservation of the State rests with an individual or a group of individuals. In a democracy, on the other hand, the sovereign power is exercised by the people. If the people do not exercise their prerogative of sovereignty, democracy must perish, for power wasted is opportunity lost.

The acid test of democracy comes, therefore, when duty calls, and today duty does call every freeman on the face of the globe. Thank God, our call in America is not to war, but to prevent war by preparing for war—and by your works you shall be judged. If the fruits of democracy are selfishness and individualism we shall not stand the acid test; but if altruism and duty move us, America need have no fears for the future.

At the present time one-half of the civilized world is engaged in war. Of all the great nations we alone are at peace. Warring Europe is no longer solely guided by calm reason, and neutral though we may try to be, we must argue with passion and be prepared to meet the fate of the peacemaker who, in an attempt to please all, offends all.

And not only this, we must also remember that when this war ends, we shall be the rich weak man of the world; while, less amiable and altogether desperate, there will stalk abroad the strong and hungry man of Europe. Hunger, poverty, and strength, versus weakness, wealth, and abundance! Can anyone doubt the result if weakness remains?

Yes, America is weak, the weakest of all the great nations of the earth. It is not a paradox to state also that she is the most powerful. Her power, however, is almost totally potential (economic), while that of Europe is actual, kinetic (military).

Potential power is expressed in terms of men, resources, and genius, and America is blessed with an overflowing measure of each. But

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nearly all of this power is as valueless, from a military standpoint, as is the unmined gold in the bowels of the earth.

Military power is expressed in terms of trained men, applied resources and organized genius, and of these, trained men rank first. If a nation of inferior resources and genius possesses trained men it can safely wage war against a wealthy, untrained people, and subdue them before they have converted their potential strength into real strength. Thus it is that the call has been sounded for our democracy to convert its potential strength into real strength, and to remove the menace of weakness to which the developed power abroad has exposed us.

A British writer, quoted by Coe in THE MILITARY SURGEON, accuses Americans of having "Force without direction; noise without significance; speed without accomplishment." If we of the medical profession do not join one of the organized agencies that will turn our potential into real military efficiency, we will be guilty of the first charge, "Force without direction." If we limit our patriotic endeavor to a resolve to "volunteer" when war comes, without preparing for the ordeal, we will be guilty of the second charge, "Noise without significance." If our profession begins its military activity by hastily applying for high military rank after war begins, we shall again have "Speed without accomplishment," as was the case during the Spanish-American War.

In every body of men there are some who are slackers—some who, at any price, will avoid responsibility—some who are totally selfish, and some who are moral and physical cowards. In the medical profession, representatives of each of these classes can doubtlessly be found; but each year of observation makes me more and more convinced that our profession is freer from these yellow streaks than any other class of men in the world. I do not for one moment believe that a predominance of these qualities accounts for the humiliating fact that in this great country only 2,000 doctors have thus far joined the reserve, and that in some of our great cities only a handful of men have registered their resolve to live up to their sovereign responsibility to prepare for national defense.

The restraining influences that have prevented the doctor from joining the Army Reserve have been:

1. Apathy, born of a lack of appreciation of the necessity for preparedness.

2. Ignorance, of the fact that an opportunity to do one's "bit" is open to all medical men.

3. The very natural fear lest the acceptance of a commission in the military service may involve an unnecessary sacrifice of time, money and professional opportunity.

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In these days when so many States are "dry territory," America as a nation may aptly be compared to a man who has been on a spree during which an inflamed brain has wrought visions of might and grandeur. It has been truly American to boast that one American could lick three of any nationality, and all of us still believe that we are the "best ever." The cold gray dawn of the morning after brings a realizing sense of shame and weakness to the alcoholic noisy one; and by the same token, America reacting from the exhilaration she has experienced in her fool's paradise, is beginning to take stock of sober fact, to feel shame in her weakness and in her "noise without accomplishment." One of the sober facts that we are beginning to understand is that, though a good medical education partially fits a man for the duties demanded of a military surgeon, it does not fit him for this specialty any more than it fits him for any other specialty. It is apathy that has prevented us from realizing the fact that special training is required of every physician who wants to practice the specialty of military surgery. Unless we assume the obvious burden of individual preparation for national difficulties we will go into our next great war with the certain prospect of resulting death and inefficiency that has made a scandal of every military operation conducted by untrained levies.

At this moment we have in the reserve barely enough men to reinforce the regular army and the militia on the border. Had we gone into Mexico for active duty even this first line of defense would have been inadequately manned with trained surgeons. Our supply is nearly exhausted now, and where shall we look for trained surgeons to provide for the huge volunteer armies that a war of the first magnitude will call forth? The only answer is "from the reserve" which as yet is like the parts of an unassembled machine, full of potentiality but powerless. Twenty thousand reservists in the medical section are what we need, and these must be assembled and coördinated by training. It is therefore absolutely necessary for us to create a trained reserve at once, if we are to be prepared.

I am tempted at this time to go into the question of the necessity for trained medical officers, but time permits me to present only a few statistics, and let the contrasts presented argue their own case. I shall not harrow you with figures of pre-sanitary days, when lack of sanitary knowledge, rather than lack of sanitary preparedness accounted for such death rates as existed in the English Army in Zealand where the annual death rate rose as high as 756 men per thousand in October, 1809; nor shall I dwell upon our own Spanish-American War, where even in the light of modern military sanitation our unpreparedness cost us several

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thousands of lives. Let us take a few statistics from the present European War, where preparedness has been a live issue for years. Here let us scrutinize the meager reports of "Prepared Germany, fairly prepared France," and let us in our imagination reflect upon what unprepared America would suffer under like conditions. *British Medical Journal*, 1916, 1, 770.

"German casualties to date include:

Killed and died from wounds 664,554
Died of sickness ..... 41,325"

Had Germany been as unprepared as we were in the Spanish-American War, and had suffered accordingly, these deaths from sickness would have totalled two and a half millions, and Germany today would be a conquered province. But even in "Prepared Germany" we find the best results did not follow until the experience acquired in actual conflict had completed their hitherto theoretical training. I cannot give you the latest ratio of death from disease to death from wounds, but as an index of the increasing efficiency of the Medical Department, I quote from Louis Fraenkel in the *Ugeskrift for Laerger*, showing results of treatment in German military hospitals:

1914	*Fit for service*	*Died*	*Unfit*
August	84.8%	3.0%	12.2%
November	87.3%	2.1%	10.6%
1915			
January	88.7%	1.4%	9.9%
April	91.2%	1.4%	7.4%

Compare these results with those of "Partially prepared France." The *British Medical Journal*, 1915, 11, 483, speaking of the proportion of recoveries of wounded in the French armies, states:

"It was in December, ——, that the average proportion of wounded returned as fit for service was only 22.3 per cent. . . . In January and February, the proportion rose to 64 per cent. In April, to 86 per cent." Again, in a later number of the same journal, Bertillon, Director of Medical and Surgical Statistics of the French Army, states that the mortality of the French wounded was 5.8 per cent at the beginning of the war, but now (Dec., 1915) it was 2.3 per cent.

I regret that I have no reliable statistics from England, but from all that I can gather that same story is told of terrific waste of life and limb early in the war, with gradual and steady reductions in mortality from both wounds and disease as the Medical Department acquired training and experience.

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From no source have I been able to gain the impression that either England or France, after two years of training, has ever been able to render the efficient service that is reported from Germany ever since hostilities began; although the differences in results obtained grow less with each succeeding month.

Do these simple figures require further explanation? America possesses about 440 trained regular medical officers, with several hundred more undergoing instruction. In the National Guard we have about 800 partially trained officers, and in the Medical Reserve Corps there are about 600 who have had more or less instruction. With this force we have been able to maintain on the border about 150,000 troops in good health. If called upon for active service in Mexico, I doubt if these medical officers could supply adequate and efficient service for even this force because we have no *surplus* to replace those gazetted on the casualty lists. The Budapest correspondent of the *Morning Post* for December 29, 1915, reports 3,109 casualties among medical officers of the central powers. These figures will serve as an index of what we may expect in the way of losses in our department in any first-class war.

From the foregoing two facts may be deduced. First, the transition from civil life to military life is a change of environment, and, unless we prepare for the change by training, we will be a disrupting force rather than a constructive force.

I grant you that surgeons intended only for ward work in base hospitals require far less training than do men required for field service, but this does not alter the fact that a man without military training is a misfit in the military establishment, no matter what duty he attempts. This is true of teamsters, depot clerks, pay clerks, and chaplains, but it is far more true in the case of surgeons who must be made available for so many of the duties of a soldier. So much for the apathy of the medical profession that is born of a lack of appreciation of the necessity for preparedness.

Let us next discuss the ignorance of the medical profession of the fact that an opportunity to do one's "bit" is open to all. This is the second cause that has been mentioned to explain why our Medical Reserve contains only 2,000 members in the tenth year of its existence. This might have been due to apathy, because like all the rest of the country the medical profession has been too apathetic to inquire into the question of what it could and should do. With the explanation that this is not individual, but rather an expression of national lack of self-preparedness, I will use this text to explain the opportunities that are offered to the medical profession.

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It is to the credit of military medicine that the Surgeon General of the Army was the first American to cause the enactment of preparedness legislation. I refer to the Medical Reserve Corps law which became effective in 1906, and which by next July will have become merged into the Officers Reserve of the U. S. Army.

THE MEDICAL RESERVE CORPS

The medical section of the U. S. Army Reserve offers our physicians service under the same conditions as were granted to officers under the old Medical Reserve Corps, and it is the reserve that I have referred to above. There is no published list of classes into which this reserve is divided, but such classes do exist, and I will attempt to explain them.

(*a*) *Doctors over 50.*—It has been unofficially understood that, as a rule, these men were available as consultants or for base duty only. They usually have been men of great professional ability, who in time of peace would build up interest in army work, and would by their teaching and example influence young men to take up that active part in army work from which their own age excludes them.

(*b*) *Doctors over 35.*—Likewise these are usually men of high professional standing, and are available for any active duty except duty at the far front.

(*c*) *Doctors over 25.*—These are the bright young men of the profession who can best spare the time required for training, and who constitute the class that should be encouraged by the older men of the Reserve to come forward to fill up the ranks.

THE RED CROSS

Closely affiliated with the Medical Section of the Reserve we find in the Red Cross a second organized agent upon which we may spend our energy to good purpose. This organization is the authorized volunteer body, recognized by Congress as the official aid to the Medical Department in time of war. It has other functions, but these do not now interest us. Congress has authorized the use of Army surgeons in the preparation of the Red Cross for military relief work, and one of these surgeons, Colonel Kean, has already organized hospital units of 500 beds, ready for immediate use, in several of our great cities. Army regulations provide that if these organizations are called out for service, they shall be placed under the immediate direction of an Army medical officer. Regulations also state that Red Cross organizations shall be trained, and at great length they describe the subjects they are to be trained in, and the kind of organizations they are supposed to man in time of war. Nowhere can I find any mention of a requirement that

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the personnel of the Red Cross units shall belong to the Reserve. Perhaps I am wrong, but I cannot believe that this is as it should be. At present we have developed plans to train the Reserve, and the training given is exactly the training required for the personnel of the Red Cross. There should be no objection to having the Red Cross manned by reservists, and there is every reason why doctors who expect to serve with the Army should receive a soldier's training such as we are beginning to give to the Reserve. I repeat again the great truth:

The transition from civil life to military life is a change of environment, and unless you prepare for the change by training you will be a disrupting force. I also want again to emphasize the fact that a patriotism that allows us to wait without preparation for war to come before we offer our services, come dangerously near to being "Noise without accomplishment." Unless Red Cross training camps are established, the Reserve offers the only opportunity to acquire the necessary training for Red Cross Units.

There is, and there can be, no conflict between the Reserve and the Red Cross. Both are reserve forces of the Government; each requires the same kind of training. The Reservist is eligible for advanced rank in the U. S. Volunteers in case of war, if he fits himself for this work. So, also, is the officer of the Red Cross. Membership in the Reserve will not conflict at all with the activity of the Red Cross either in time of peace or in time of war.

I have written thus far of the strictly volunteer surgeon. The National Guard Medical Corps, as now constituted, is a part of the first line of defense, and it demands of those who enter this service a greater sacrifice than the average man can afford to make. I wish to invite attention to the fact that the National Guard Medical Officer has given the country its most conspicuous example of patriotic devotion. He has, without hope of reward, given years of service to his state and country under the most trying conditions, and I urge all to remember this fact, and to give to him the appreciative encouragement that he so richly deserves.

If one cannot make the sacrifice that service in the militia demands, he can at least encourage, aid, and honor those who have taken its burdens upon their shoulders. The Regular Army is open only to those under 32 years of age.

Having discussed the organizations whose membership is open to us, we will now turn to the third cause which has prevented many civilian doctors from taking their part in the national scheme of preparedness; the first being apathy, born of ignorance of the necessity for preparedness; the second, ignorance of the opportunities that are presented to us; both of which I have discussed.

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The third cause is the fear lest the acceptance of a commission may involve us in responsibilities that we cannot afford.

This bogey has haunted the Medical Reserve Corps ever since its birth, but can any one tell me of a single instance that he has ever heard of where a Reserve Corps man has been called upon for service that he did not request, or at least assent to voluntarily when invited to render service?

In the past the War Department has recognized the fact that the Reserve does not belong to the first line of defense, and that nothing except grave necessity should induce the Government to call upon the Reserve for a sacrifice against its wishes. I wish to be even more specific upon this point.

If a war with a first-class power is imminent, or exists, the War Department will compel the Reservist to serve in training camps, or at the front, as the case may be. Here the end to be gained transcends in importance any personal sacrifice that our disruption from home ties would entail. Unless we are willing to make any sacrifice in such an emergency our services are not solicited, for we are called by duty and patriotism to prepare for a national emergency, and when a real emergency arises no red-blooded man will barter his opportunity for any price.

In minor wars or threatened wars the War Department will first exhaust the supply of those able and willing to serve, before it will urge service upon those who are less able and willing. Our recent Mexican unpleasantness illustrates this condition. During the past three years every man in the Medical Reserve Corps has been at intervals asked to express his desire for or against service. Of the 1,600 to 2,000 members of this corps, I am proud to state that several hundred have accepted service, and about 250 are now in service. Of those who have served, and are now serving, not one has been put on active duty without his own self-expressed consent, and not one has been held in service after he has asked to return to the inactive list, except, perhaps, in isolated instances where men have been held for short periods while awaiting the arrival of their relief.

We, of the Army, are intensely proud of these facts. The response of the Reserve to the call of duty has been magnificent, and the generosity of the Government in adapting its demands to the convenience of the Reserve Corps has been equally worthy of praise. We of the Army therefore think we have the right to ask you to trust us. We have not abused their trust and we will not abuse it in the future. The Surgeon General is not only one of the wisest of men, but he is one of the most human, and the policy of his office toward the Reserve Corps can be

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summed up in the words of the Golden Rule, "To do unto others as I would have them do unto me." It would be neither wise nor human to tear the reserve officer away from his home ties and professional interests without his consent, unless the sacrifice demanded was commensurate with the end to be gained. The only emergency that would justify such a sacrifice is an emergency that threatens our national integrity.

This point should be clearly understood, for we can never hope to build up our Reserve unless it is clear that in joining the Reserve Corps we are not committing an act that may uselessly imperil our well-being and that of our family.

Some of the old Medical Reserve Corps have already become alarmed lest the provisions of the new bill creating the Medical Section of the Reserve may impose upon them the obligation to take the correspondence courses, and to spend fifteen days yearly in camp. It is true that those who desire advanced rank must earn it by making themselves worthy to hold the positions they seek, and it is true that Congress has authorized the War Department to call out the Reserve for training for fifteen days of each year, but it qualifies the statement by adding, "in so far as appropriations may permit." Each officer ordered to camp will have all of his expenses paid, and this will be an expensive affair, so expensive, in fact, that many of the Reserve who desire to go to the camps may be denied the privilege because the appropriations may be too small.

If the Army Reserve is filled, as we hope it soon will be, we can safely rely upon a certain proportion of the list who will want to train for service at the front; others will want to qualify for service in the zone of the line of communication; others will want to qualify for base work—Red Cross work. In addition to this, there will be the older men who will desire to qualify as consultants, operating surgeons, etc. Our experience with the Medical Reserve Corps is an earnest of what the greater Reserve will be, for in this old Medical Reserve Corps we have found that strictly volunteer service is all that it has been necessary to ask of them. He only is truly happy who serves! The gift of Midas would be poor indeed in comparison with the wealth of opportunity here presented, the opportunity to serve our country.

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MILITARY DOGS

By Captain E. C. JONES

Medical Corps, United States Army

LIKE numerous other things in the way of preparedness in this country, the use of the dog, from a military standpoint, has been sadly neglected. With the exception of Japan and China, the United States is the only large nation where the government has not accomplished something in developing the military dog.

Germany has made a closer study of the usefulness of the dog in time of war than any other nation. That she has been justified in expending the time and money she has for this purpose, will readily be appreciated by glancing at the few instances cited below, showing some of the things these dogs have accomplished.

The idea of using dogs in searching for the helpless originated with the monks of the Monastery St. Bernard, who trained the well-known St. Bernard dog to search for and help travelers lost in the snow drifts. Their success apparently inspired the Germans to take up the training of dogs to search for wounded and for use in messenger and outpost duty.

This work was first started by the Germans in 1885. In 1890 two trained dogs were assigned to the Battalion of the Garde Jaeger (sharpshooters of the Guard) and these were the first official dogs of the sanitary service.

In 1893 the Society for the Training of Sanitary Dogs was established at Oberdollendorf and this was encouraged and aided by the German government. In 1895 the first exhibition of the work of these dogs was held, and at this exhibition in one-half hour, the bitch Sanita found eight "wounded" who had been concealed in the most difficult places. From that time dogs were trained and assigned to troops, and the civilian societies that were organized for the care of wounded, were assigned trained dogs which were to become part of the Army Corps in case of hostilities.

As a result of this the German Army had over 2,000 of these trained dogs at the beginning of the present war, and at the end of the first year of the war it has been estimated that over 2,500 were being used constantly. So valuable were their services deemed by the German government that they established a dog hospital at Jena where all wounded and sick dogs are sent for treatment.

The French became interested in the military dog about 1895, but it was only through the perseverance of an infantry and a medical

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officer that any government aid was given towards the training of these dogs, and this not until 1908 when the French Red Cross gave support to this work.

Later on the French government established kennels and carried on the work. At the beginning of the present war it has been estimated that France had fifty trained dogs and fifty in training. However, immediately after the war started a large training place was established south of Paris and has been working continuously since.

Italy became interested in the subject about the same time as France and a special establishment, under the supervision of a major of infantry, has been maintained near Rome.

Sweden has a society for the training of these dogs, and this society receives support from the king.

Holland has had a special establishment for training these dogs since 1909. This establishment is under the direct supervision of two army officers.

England has had a number of societies interested in the training of these dogs, but up to the beginning of the present war very little support had been given by the government.

Russia apparently did not become interested in the subject until during the Russo-Japanese War, and not then until the Emperor of Germany presented the Russian Army with three trained dogs, whose work was such as to show their value.

It is impossible to estimate the number of lives that could have been saved and the amount of suffering that could have been prevented in past wars had trained dogs been used, but the known results, as stated below, that have been obtained cannot but cause one to wonder why the military dog has been neglected in this country when its services could be had at such small expense and trouble. Especially is this true when it is remembered that a well-known military authority has stated: "It is useless to count the missing. In modern warfare the missing should be counted as dead."

In the Franco-Prussian War after two battles were fought in the month of August, 1870, the number reported missing by the French was 9,892, and by the Germans, 1,460. How many of these 11,352 missing men could have been found and saved, and how much suffering could have been alleviated had military dogs been used at that time? We may draw our own conclusions from the following:

The three dogs given by Germany to Russia, after one battle in the Manchurian campaign, found twenty-three wounded men after the search had been abandoned by the Russian litter bearers.

Lieutenant Johannes writes that during the Anglo-Boer War "dogs

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have saved the lives of hundreds of wounded who could not be discovered by the searchers."

In December, 1915, more than 800 wounded men were known to have been saved by dogs in the German military service, after the search had been abandoned by the litter bearers.

In a recent article in a German periodical the following statement is made: "In places where it is difficult to search, these animals, due to their speed and fine sense of smell, have been of great value to the litter bearers. Their main usefulness is in the after-search, and if no more wounded are found by them in a certain place it can be assumed that no wounded are left there. Without doubt we already know that many thousands now fully recovered again face the enemy to defend the fatherland or are restored, as invalids, to be useful to themselves and others, would have been left to die from their wounds were it not for the watchfulness and instinct to search of these four-footed assistants of the Red Cross. The training of these dogs is one of the great undertakings of the German Red Cross, which looked at it in time of peace as being a good work and which certainly has borne great fruit in this war."

In Major Fauntleroy's report on the medico-military aspects of the European War he states: "The so-called 'Red Cross' dog is made use of at portions of the front in connection with locating the wounded. They are used successfully for this purpose in the Vosges, in the Argonne Forest and other wooded regions.

"These dogs become very proficient in locating the wounded, and as an indication that they have found one, they are taught to bring back to the station some article of clothing belonging to the wounded man, such as a cap or handkerchief. Lately they have been trained to carry ropes to the wounded in front of the trenches, which enables a wounded man to be pulled back into the trench by his comrades."

In modern warfare the removal of the wounded from the battlefield is a serious and a difficult problem. In the majority of instances the wounded must be found at night and the use of lights for this purpose is impracticable. Without the use of lights, finding all of the wounded by the litter bearers is an impossibility. Here is where the trained dog will do his work.

Before the present war in Europe, at the German training establishments, definite schedules were carried out in the training of these dogs and hours of instruction were given just the same as in the training of recruits. The progress of their training and the completion thereof had to be tested by examination, and these examinations had to be conducted in the presence of the battalion commander and the results

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filed with the dog's descriptive card. After completing training and being assigned to a battalion they were required to accompany that battalion to all field exercises, and battalion commanders were required to see that the dogs for outpost duty, messenger duty and sanitary duty were kept busy during the field exercises.

The dogs trained for sanitary purposes were taught, when the wounded were found, to make this known to the litter bearer in one of three ways: To remain with the wounded man and attract the bearer's attention by barking. To return to the litter bearer and bark and then lead the litter bearer to the wounded man. To carry some article such as a hat, a handkerchief or any part of the wounded man's equipment, back to the litter bearer and then lead the litter bearer to the wounded man. The first two methods have been discontinued on account of the barking of the dog attracting the attention of the enemy. While the latter method is said to be the best it is also said to be the easiest training.

The benefits to be derived from the use of the military dog for outpost and messenger duty is too broad a subject for this article, but it may be well to keep in mind that a number of lives could have been saved in the Philippines, and probably at Columbus, had such dogs been used.

It may not be amiss to state briefly what the civil authorities are doing with trained dogs, so some idea may be formed of their value along this line, from a military standpoint.

Recently I had an opportunity to observe the work of the police dogs of the Police Department of New York City. The dogs are used there chiefly in the wealthier residential districts. The dog accompanies a policeman on his beat. The policeman walks slowly along the sidewalk while the dog searches the grounds, outbuildings and shrubbery surrounding a residence and then returns to the policeman. This is continued from house to house on that policeman's beat. If the dog discovers a suspicious person in that vicinity he barks and attacks. I was allowed to act as the "burglar" in the following trials. The dog found the "burglar" four out of six times, even though at one time he was hidden in an entryway to a basement, another time in a garage when the door had been left slightly open, and another time on the railing of a back veranda that was covered with vines. Each time when the dog discovered the "burglar" he commenced to bark and attacked at once. (He was muzzled then, of course.) If the "burglar" started to run the dog grabbed his leg with his fore paws and tripped him or ran between his legs and tripped him in that way, and the "burglar" found it impossible to get away until the policeman came up. On

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another occasion the policeman had the dog guard the "burglar" after he had caught him standing on the ledge of a window. He remained right at the "burglar's" heels and, if he started to run, attacked him and tripped him until the "burglar" finally gave up as he found he could not get away. There had not been a robbery committed in this district for months. Before the dogs were used there robberies were comparatively common.

The majority of the dogs used in the German Army are the German sheep dog, although some Belgium sheep dogs and some bird dogs are being used. France is also using the above dogs and also English hounds, collies and airdales. The majority of the police dogs of New York City are the Belgium sheep dog. The German sheep dog, if of pure breed, is unquestionably the best dog for military purposes.

In the spring of 1916 a wealthy resident of Philadelphia and one in Scranton became interested in the use of the dog for sanitary purposes in our Army. The one in Scranton had kennels, which he had built after visiting the kennels in Germany, and they are strictly modern and complete in every way. He also has a number of pedigreed German sheep dogs which he brought from Germany. These two patriotic citizens were sufficiently interested in the matter and so anxious to see the training of the military dog placed upon as sound a basis in our Army as it is in Germany, that they were willing to do this:

They offered to pay the expenses of sending an officer to Europe for three months, if he would agree to study the latest methods used there in the training and use of these dogs. Upon his return they would arrange for the use of the kennels at Scranton, furnish and feed the necessary pedigreed German sheep dogs, pay the difference between half pay and full pay of this officer, if it were necessary for him to go on leave on half pay, furnish quarters for three hospital corps men who were to be instructed as trainers and give them the benefit of the experience in training dogs that was had by employes of these kennels. Provided the Government would give this officer three months' leave with permission to visit Europe, give him leave on half pay for eighteen months on his return, detail, or place on an indefinite furlough status, three hospital corps men, and if at the end of this time the plan was found to be a success, the War Department should found a training establishment for training these dogs along the general plan adopted by Germany. After the above had been carried out, if it was not considered a success by the War Department, the whole matter was to be dropped and no expense whatever paid by the Government for the experiment. Both of these persons felt that this was the only way in which the plan could be carried out successfully and placed upon a substantial foundation. At

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the end of the twenty-one months the War Department would have at its disposal four trained men and a certain number of trained dogs, and all that would then be necessary for the War Department to do would be to build the necessary kennels and start the school of instruction. Suitable kennels could be built at some abandoned post at a nominal cost.

Neither of these persons had any mercenary motive in the matter whatever. To carry out the above proposition would have cost them very nearly $10,000. This they were willing to spend if they could be of any service to the country in the way of preparedness, for they both realized the backwardness of this country in this respect.

Strange to say this proposition was rejected. Still it took almost sixteen years for two army officers to convince the French government of the value of these dogs, and then they only took it up in a half-hearted manner, so at the beginning of this war, France found herself with only a few trained dogs, fewer trainers and less of the right type of dog.

If this proposition had been accepted by the War Department or the Red Cross and it was found to be a success, a government training establishment might have been founded, a certain number of dogs trained each year and men from different organizations sent to this establishment to receive instructions in the training and handling of these dogs. At the completion of this instruction they could be returned to their organizations with the trained dogs assigned to them. In this way it would take only a few years until sufficient trained men and dogs would be available for the Regular Army. The supply for the volunteers or National Guard could be furnished also from this establishment and by civilian societies that would become interested in the work, when they saw the results obtained at the government establishment. In fact one such society has already been organized at Englewood, N. J., as a result of the good work done by these dogs in the European war.

If Europe has not got to the length of mobilizing her dog power, the friend of men is certainly doing his bit at the front and has rendered valuable services to all the belligerent armies. He is chiefly used for ambulance work; the Germans have a German Red Cross Dogs Society employing 2,500 dogs, and a special military hospital for canine helpers hurt in battle; but he has other uses as well, and the French have five classes of war dogs: watch dogs, patrol dogs, messengers, ambulance dogs and pack dogs. These dogs are sometimes mentioned in despatches and are awarded the War Cross Star, as in the case of Lutz, the dog hero of Verdun, whose exploits were thus officially chronicled: "Employed as an advanced sentinel during the night of February 21, he first gave warning of the German attack by repeated growls and compelled attention."—London *Graphic*, December 30, 1916.

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PRESENT STATUS OF ARTIFICIALLY TREATED DRINKING WATER IN THE FIELD

By Major WILLIAM LYSTER
Medical Corps, United States Army

(With six illustrations)

THE recognition of the value of safe drinking water in the field has lead to the rejection of all raw water of uncertain quality by modern armies, unless compelled to use it through military exigency. The beneficial effects of furnishing troops with safe drinking water has been recognized now for a number of years as a practical matter; that this was a desirable thing to accomplish if possible, has been known, in an indefinite way, for some hundreds of years.

A review of the methods and appliances offered for the purpose may be of value as indicating the trend of further advance in method and equipment. It is an axiom with the military sanitarian that water-borne diseases may be avoided. Nor has the extensive development of vaccination against typhoid as a prophylactic measure rendered altogether unnecessary the taking of precautions to avoid this disease. A similar procedure is being used today, when thought necessary, to prevent the spread of cholera in European armies. But just as an attack of typhoid does not always insure the victim against a second infection, neither does vaccination give a guarantee that a massive dose, or even a moderate dose, in an exhausted and weakened subject, will not be followed by an attack of disease. It is necessary, therefore, in spite of the brillant results obtained through vaccination against typhoid, for us still to endeavor to secure potable water in garrison and in the field. The same measures relative to water which are effective against typhoid will suffice in protecting against cholera and dysentery.

In fact, a recognition of the danger from impure water is more marked generally today than ever before. The present war, with an unprecedented number of men in the field, practically amounting, in the continental countries, to the mobilization of the male population, has increased the dangers of water-borne diseases. It must be realized that in the extraordinary size of the armies abroad the percentage of those not in the highest state of physical condition is greater than in small armies of selected material. We must look for a relatively greater number of carriers of disease. Though the average age of a soldier may be lower in volunteer armies, the poorer physical condition of a percentage in national mobilizations will have to be taken into consideration. We have in these tremendous armies of today not only the imma-

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ture types found in volunteers but the adult type of middle age; and while we may find among the latter a greater degree of immunity to certain diseases, we will also find a greater number of carriers than among the younger soldiers, many of whom have never experienced an attack of typhoid fever. Furthermore, the percentage of the army coming from cities is undoubtedly larger than in the armies of the past, and we have a condition which amounts to the mobilization in the field of the male portion of the population. When this is accomplished, we have withdrawn these men from the protection of the water supply systems afforded those who dwell in cities, and it is necessary to furnish some substitute in place of this sanitary safeguard. There is also a general mobility of the population in the areas occupied by the armies that increases the chances of spreading any disease. Given these new conditions, the necessity of safeguarding the health of armies has increased. An important feature of this sanitary effort has been to furnish potable water to large and small commands.

The effort to do this has taken several lines of development. Most of us here are familiar with the Forbes sterilizer, which met with such a welcome reception by army sanitarians during the insurrection in the Philippines. That this efficient, but somewhat complicated, device found a field of usefulness in the military service, only demonstrated the difficulties of utilizing heat as a means of sterilizing water in the field.

The Forbes appliance is now constructed in form for field service to be transported on the regulation caisson wheels and axle. A "White Steamer" boiler with gasoline fuel furnishes motive power to a pump by which water can be drawn up into the appliance and forced through a filter or screen made of sacking spread over a metal frame. Water is then passed through the appliance, which is constructed on the well-known Forbes principle, the exhaust from the pump being used to heat the chamber containing the water, which is actually brought to a boiling point and is carried over to the receiving and cooling pipes by ebullition and expansion. The capacity of this appliance is four hundred gallons an hour. The containers for any such amount of water, however, are wanting and would have to be provided and a system of distribution to the canteens devised. While in a way heat is the simplest and most readily utilized method for sterilizing water, it has been found to have certain marked drawbacks. The Germans long ago developed for army use a special wagon equipped with heating apparatus for supplying drinking water in considerable quantities, but this complication of a simple matter of boiling water violated the fundamental principle of military mobility. This has been the failure of nearly all other appliances that have been since devised. Following the development of the violet ray

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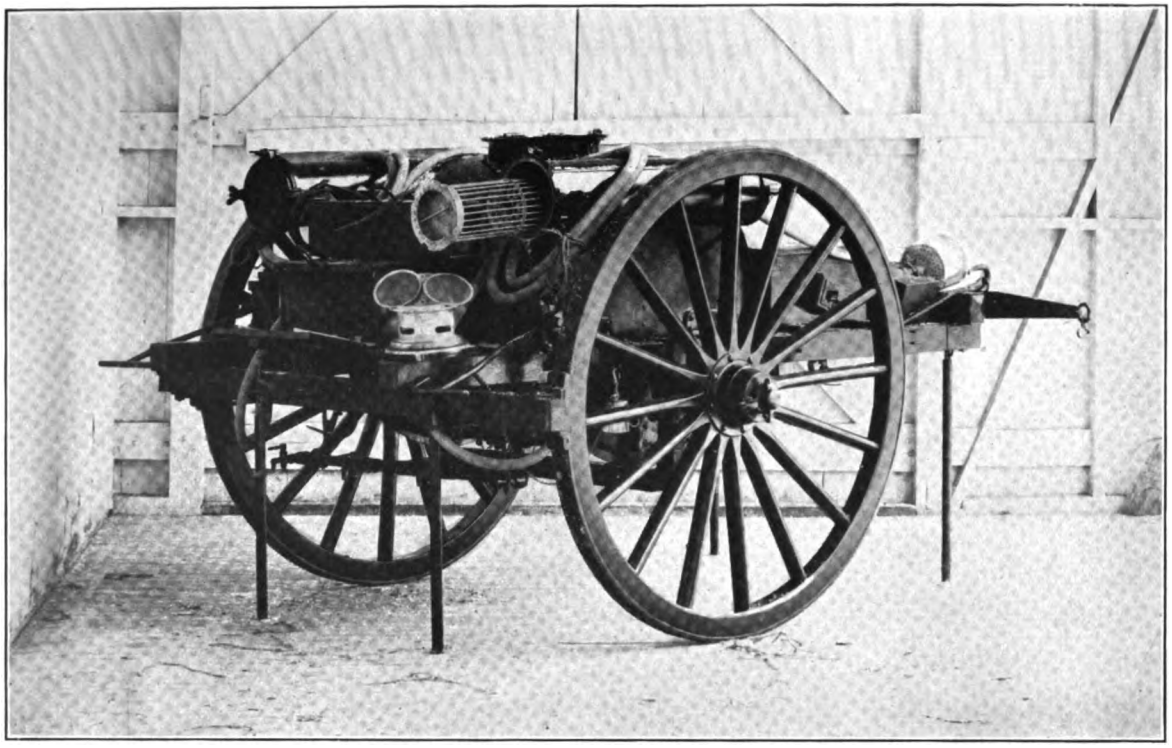

FORBES STEFTZER.

WATER IS FORCED INTO THE TANK THROUGH A METAL FRAME WHICH IS COVERED WITH SOME MATERIAL SIMILAR TO THE SACKING USED IN STRAINING WATER IN THE SUGAR FACTORIES. MUDDY WATER IS THUS CLEARED, AND, PRESUMABLY, IS TREATED WITH HYPOCHLORITE WHILE IN THE TANK. IT IS CONTEMPELATED THAT THIS TYPE OF WAGON WOULD ACCOMPANY TROOPS ON THE MARCH.

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WATER CART OF THE BRITISH ARMY DELIVERING A SUPPLY TO TROOPS AT THE FRONT. THE WATER CONTAINERS ARE HABITUALLY UNDER GUARD BY A SENTRY TO PREVENT WASTE AND CONTAMINATION.

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as a sterilizing agent, portable appliances for the field were devised by the French and actually used by their army in the field in Morocco. This appliance demanded a motor to move a dynamo which generated the electrical current necessary to pass through a mercury lamp to effect sterilization of water. This was further complicated by the fact that the violet ray is not entirely efficient if the water is not clear; hence filtration was necessary with some waters. Naturally the appliance was heavy and cumbersome and inappropriate for small detachments. It has the advantages, however, of furnishing a water without increase of temperature and which could be utilized as soon as received—a feature wanting when water was sterilized by boiling, unless in an appliance such as the Forbes sterilizer.

Probably the first appliance devised for treating water in the field, if we except the use of heat, was a filter. It is unnecessary to review the various types, except to state that the most efficient and satisfactory device for military purposes was the Darnall filter. In fact the only criticism that can be made of this device is the restricted output and the limitation of the appliance to commands that have wheeled transportation.

More recently an improvement in the process of developing ozone, which is used to destroy organic matter in water, has caused its advocates to develop an appliance adapted for the field. This has precisely the same objections that the violet-ray apparatus has, and which the Forbes sterilizer possesses to a lesser extent; namely, a heavy and cumbersome appliance, complicated in structure, liable to injury and very likely to get out of order in the rough usage that it must inevitably meet. At the present time a mechanical appliance, based on the principle of centrifugal motion has been devised and brought to the attention of the War Department as a means of treating water in the field. This is a development from the machinery used in the manufacture of sugar, and at the present writing there is reason to believe that this method may be efficient. But, again, it is another instance of being asked to carry into the field a heavy and cumbersome piece of machinery, difficult to keep in order and requiring several animals to transport it.

It has been rather surprising, with all the attention devoted to this feature of military sanitation, that sterilization of water with hypochlorite of calcium should have been the last of the various methods mentioned to attract attention. Reports from the armies engaged in Europe indicate that the hypochlorite method is in general use in the field by practically all armies. A paper was read on this subject at the Cincinnati meeting of this association, being an account of the work begun in 1910, when experiments were conducted on the sterilization of

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water in the swimming pool of the University of Pennsylvania. An English medical officer has described an apparatus for the generation of chlorine gas which was used for sterilization of water in the field. This was actually tried out in India before the present war, and an account of this appliance appeared in the *Journal of the Royal Army Medical Corps.*[1]

A method of sterilization of water with hypochlorite of calcium, described by Prof. G. Sims Woodhead, M.D., also appeared in the *British Medical Journal.*[2] Still another article on sterilization of water by the use of hypochlorite capsules appeared in the *American Journal of Public Health.*[3] This method devised by an English medical officer and Professor Woodhead marked an advance in the practical treatment of water in the field. Capt. J. J. Harper Nelson, M.D., also published an article in the *British Medical Journal.*[4] These methods are still, however, open to one important objection—they involve, in the case of the chlorine gas generator, the use of a somewhat cumbersome and delicate appliance and one that is impracticable for small detachments. In the case of the water cart, in which the water is sterilized by hypochlorite, good roads are necessary in order to have the appliance accompany troops. In common with all the appliances discussed, we must either provide special containers for the water after it is treated or have with us all of the time a cumbersome water cart. The objections to the water cart and to wheeled appliances for the sterilization of water are: (1) passable roads are required; (2) the weight and size of the appliance; (3) such appliances are only adapted to larger commands, a regiment or more; (4) small detachments and scouting parties are not provided for; (5) the occupation of additional road space, and (6) the necessity of supplying forage or fuel.

To reach the highest point of efficiency, in any system of supplying potable water in the field, we must have one that will supply water to everyone in the army. At the present time, hypochlorite of calcium is undoubtedly the agent which offers us the greatest chance of developing such a system. In a most comprehensive article by G. Wesenberg, of Elberfeld, Germany, published in the *Hygienische Rundschau*, Vol. xxv, 1915, an account is given of successful experiments with this agent in the sterilization of water for drinking purposes. The author uses a high percentual calcium chloride, which carries about 75 per cent of chlorine. This is a product not obtainable in this country today. The principal advantages are the greater stability and the smaller amount of the chemical necessary for use. The author devised a process of neutralizing the water after being treated with the chlorine, using ortizon, a stable compound of peroxide of hydrogen and carbamide.

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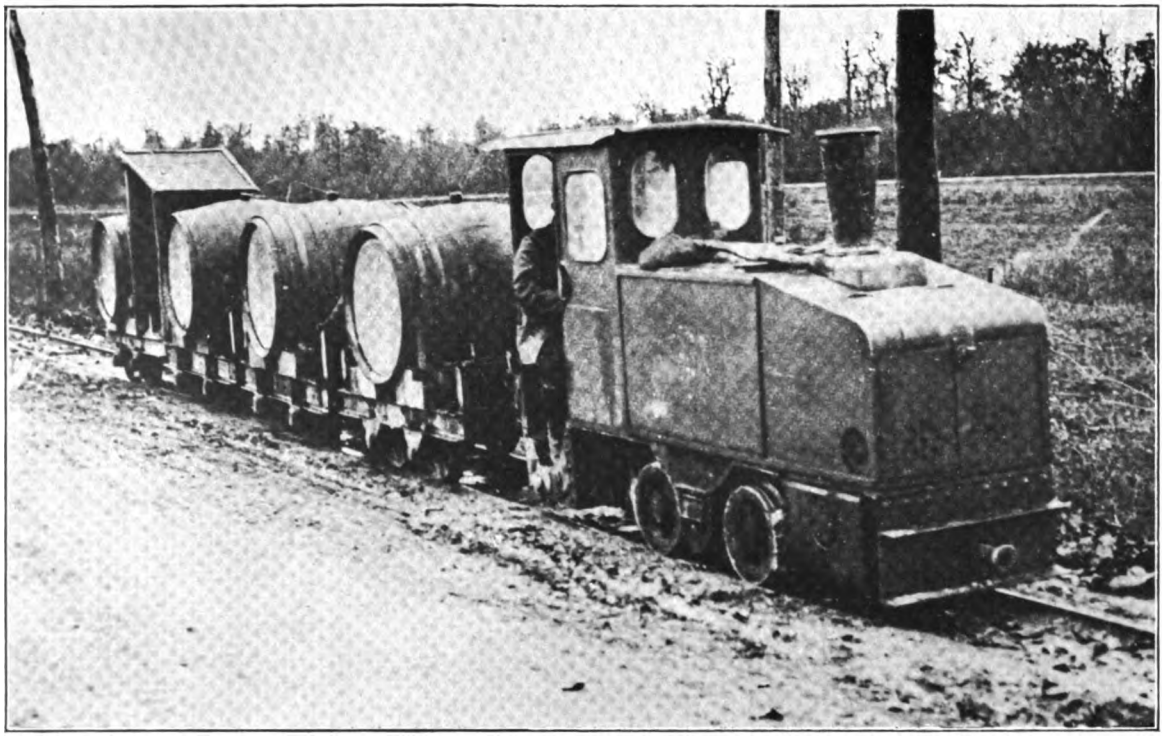

WATER TRAIN ON THE FRENCH FIELD RAILWAYS USED TO CARRY PURE WATER TO TROOPS IN THE TRENCHES.

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Wesenberg's idea was to provide each soldier with a small box containing a tube of tablets of percentual calcium chloride and the ortizon in separate glass tubes with directions for use. Some container is essential in order to hold the water during the process of sterilization; he suggests the water bottle. This author states:

Providing unobjectionable drinking water for the troops in the field is one of the most important and perhaps also one of the most difficult problems of the military administration; all the more so, because often enough providing the required amount alone is almost impossible, even if no consideration is taken of an unobjectionable quality of the same. In fact sources must often be utilized the water of which does not at all come up to the requirements that must be made of drinking water.

The use of $CaCl_2$ in general practice was prevented thus far through its low degree of chemical stability, as also by the fact that after the sterilization of the water those chemicals which were needed for their combination with the liberated free Cl were not sufficiently stable; when using sodium sulphides there are generated sulphates which are not altogether indifferent to the human organism, since by the ingestion of larger quantities they have a laxative effect. Lately it has become possible to produce a $CaCl_2$ of satisfactory stability which, in addition to this, possesses the advantage of containing in its contents of 75 per cent of pure $CaCl_2$ a 2½ to 3 fold amount of active Cl of the kinds of $CaCl_2$ formerly sold in the open market which contained only 30 to 35 per cent of active Cl. (The $CaCl_2$ of the German Pharmacopeia must contain at least 25 to 30 per cent.) The new product, therefore, contains a great many less impurities, which generally consist mostly of the insoluble carbonates of calcium, and is therefore almost entirely soluble, so that the water mixed with this $CaCl_2$ shows only a very insignificant cloudiness.

Thus while the $CaCl_2$ of high percentage loses after having been preserved eight months only 6.7 per cent of its original contents of Cl (= 100), the common commercial product loses in about the same time 11.7 per cent of its original amount.

Dr. Rhein, of Strassburg, has also contributed an interesting paper to this subject. He observes, "Methods which require a prolonged operation of the germicidal matter or a filtration of the sediment formed through the neutralization of the same cannot be used in the field." For the sterilization of drinking water he employs a most stable compound of chlorine, "Antiformin." He further states that—

Antiformin is a solution of sodium hypochlorite which has been made stable by the addition of sodium hydroxide. If antiformin is combined with hydrochloric acid, then the latter unites with sodium peroxide forming NaCl and generates chlorine from sodium hypocloride. The reaction resulting from the addition of HCl to antiformin can be represented by the following formulas:

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$$NaOH + HC = NaCl + H_2O.$$
$$2NaOCl + 4HCl = Cl_2 + 2NaCl + 2H_2O.$$

Chlorine that has been generated by this method and now is dissolved in water, operates upon the germs during five minutes: thereupon it is converted into a non-poisonous body, by which means water becomes drinkable.

In the second period of the experiment I have tried to neutralize the poisonous effect of chlorine by means of various substances. The best results have been obtained by employing sodium thiosulphate.

He summarizes as follows:

By the addition of 2.1 c.c. of antiformin and 1.1 c.c. of a 25 per cent solution of hydrochloric acid to a liter of infected, filtrated water, 4 millions of coli organisms can be killed within five minutes in 1 c.c. of water. The neutralization of the poisonous effect of chlorine is performed by pastils containing sodium bicarbonate and sodium thiosulphate, in the proportion of 1.7 g. of the former and 0.45 of the latter substance for a liter of the fluid. Water treated by this method is clear, without any odor, innocuous to the human organism and with a slightly alkali flavor.

W. Krause[5] also treats of this subject. Reviewing the methods of rendering water potable by boiling, ozonizing and the use of the ultra-violet rays, he concludes that the disinfection with chemicals offers the most probable solution of this question. He rejects potassium permanganate and tartaric acid as not sufficiently reliable, and describes the method of disinfection with calcium chloride, advocating the use of calcium chloride of a firm in Elberfeld (high percentual, about 75 per cent active chlorine).

An article published in December, 1915, by Lieut. Col. Colmet D'Aage, Head of the Water Supply Service on General Joffre's staff, treats of the subject and describes a water wagon now in use with the French armies on the western front. He states:

The question of the supply of drinking water to our armies has been a matter of great concern to the military authorities; many difficulties have already been met with, and these will be even greater whenever an advance is made into new territory. The time has passed when armies relatively small in numbers could easily find sufficient water in the regions occupied by them. The strength of armies is now such that it is often necessary either to have recourse to works on a large scale in order to procure on the spot a sufficient supply of good water, or else to bring it from a distance in tank wagons or in casks on trucks or carts.

The simplest and the most practicable method of sterilization when large quantities have to be treated is by the use of hypochlorite, which has been em-

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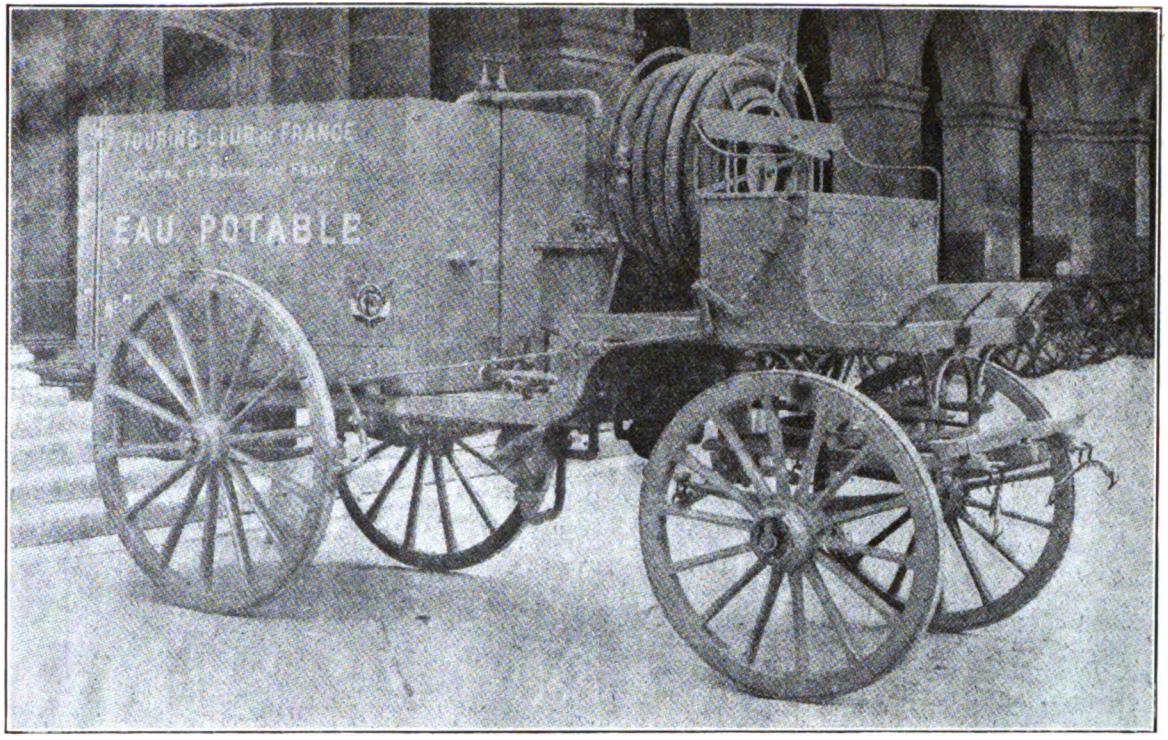

A Water Wagon (French)

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A Battery of Water Wagons (French).

(To face page 407.)

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ployed for a long time in Canada, in the United States and in England and which has the advantage of long experience. This method of treatment is very generally employed in the English Army. I found that English soldiers cantoned in France comply strictly with the orders on this subject, and English officers inform me that they have for a long time made use of this method of treatment in all their colonial expeditions and that it has always given good results.

The regulation type of wagon used by the Engineer Department of the French Army is provided with a steel tank, divided into two compartments. Empty, the wagon weighs about 1,200 kg. It holds about 3,000 kg. of water, and has four props or legs which can be let down under the body of the tank to the ground to support the weight of water while and after it is being filled, thus relieving the wheels and axles. It has a capacity of 3,000 liters per hour, and is thus able to furnish some 25,000 to 30,000 liters per diem. Fifty feet of woven hose are supplied; also two pumps, as the tank is divided into two compartments. The process of disinfection with hypochlorite can be made practically continuous, only one side of the tank is filled with water and the chemical introduced, and after being disinfected it can be pumped into casks and placed on wagons for distribution to troops, this apparently being the method of conveying the water. As the water is pumped in, it is passed through a cylinder filled with a sponge, thus clarifying it. From the great weight of water carried, it would not appear that it is contemplated to haul the water in this wagon, certainly not in full loads.

The English have been pioneers with the use of chlorine as a disinfecting agent in connection with water carts. Col. F. H. Trehune and Capt. J. J. H. Nelson published an article[6] describing the method of generating chlorine and using it for the sterilization of water.

The preponderance of evidence is all for the chemical treatment of drinking water in the field, and the chemical of choice is hypochlorite of calcium. The use of a high percentual hypochlorite has been limited to the Germans, it not being manufactured in America and apparently not in England or France. The greater stability of this article would appear to indicate its use rather than the commercial hypochlorite.

The starch iodine reaction may be used to determine the existence of chlorine in the water after the process of sterilization. It requires but little experience and skill for even a novice to determine by this control method whether the oxidation of the organic matter has been effected or not. It was hoped that decisive experiments along this line could be made during the last maneuver march of the Second Division, and sterilized bottles were provided and arrangements made for examining bacteriologically the water to be used by the division when in the field,

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before and after sterilization by hypochlorite. However, it was disappointing to learn that the water supply for these troops was carried in steel tank cars on the railroad lines, from which they were supplied during the maneuver.

Dakin[7] gives some notes on the history of the use of hypochlorite in medicine and surgery. He remarks:

> There is one point concerning the mode of action of hypochlorites that I would like to refer to before closing. It has been repeatedly stated that the antiseptic action of hypochlorous acid is due to its decomposition in the presence of organic matter with liberation of oxygen. I have been unable to find any evidence to support this statement. If it were true that the antiseptic action of hypochlorous acid was due to the liberation of oxygen, it is surprising that many other substances capable of furnishng nascent oxygen should have an antiseptic action far inferior to that of the hypochlorites. Moreover, I know of no evidence pointing to an accelerated liberation of oxygen from hypochlorous acid in the presence of organic matter. The ordinary decomposition of hypochlorous acid with liberation of oxygen is a relatively slow reaction. Furthermore, when strong hypochlorite solutions are added to animal tissues, an evolution of chlorine rather than oxygen occurs.
>
> It appears that when hypochlorous acid or hypochlorites act upon organic matter of bacterial or other origin, some of the (NH) groups of the proteins are converted into (NCl) groups. The products thus formed—belonging to the group of chloramines—I have found to possess approximately the same antiseptic action as the original hypochlorite, and it appears more probable that the antiseptic action of the hypochlorites is conditioned by the formation of these chloramines rather than by any decomposition with liberation of oxygen.

Experiments on a small scale have been made during the summer, which demonstrated that the water encountered and used on a march of some thirty days by a small command, and which was treated with hypochlorite in the proportion of one part chlorine to five hundred thousand of water, was not offensive and, indeed, rarely detected.

The "Water Bag, Sterilizing" which is now listed as part of the equipment of troops in the field in our army, gives indications of being a convenient and practical container. It is manufactured at such a price that its renewal every few months in the field would not be a serious charge. With this appliance, which weighs 5½ pounds and is as portable as the blanket habitually carried in the field, it is believed that promise is given of an appliance for sterilizing drinking water that will render a command independent of special transport, with a bacterial efficiency of 100 per cent, and a capacity ample for the command for which it is supplied.

In review we might state that any method to be universally applicable

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to the treatment of drinking water in the field must be so portable that—

1. The necessary appliance can be as easily transported as the soldier's blanket or rifle.

2. That the water treated must be available for use within a few minutes.

3. That the appliance be of such a character that it can be used under all conditions without requiring fuel.

The indications are that hypochlorite of calcium and a portable container for the water will meet these conditions.

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CONSOLIDATED WEEKLY REPORTS OF SICK AND INJURED, SOUTHERN DEPARTMENT, U. S. ARMY

1917 for week ending	Troops	Mean strength No.	Per cent of sickness	Per cent of sickness last report	Dead		Transferred No.	Actual No. of cases of						
					Disease No.	Injury No.		Pneumonia	Dysentery	Malaria	Variola	Paratyphoid	Typhoid	All other causes
February 24.....	Regular	47,758	3.51	3.42	15	2	280	72	10	10	2	..	1	2,687
	Militia	68,944	3.06	3.23	14	1	806	154	9	14	1	..	1	3,963
March 3.....	Regular	47,758	3.84	3.51	17	4	302	68	9	10	2	..	1	2,570
	Militia	68,944	2.81	3.06	11	2	671	143	6	12	1	..	1	3,338
March 10.....	Regular	49,163	3.67	3.84	16	5	358	94	18	14	2	..	1	2,786
	Militia	43,113	3.82	2.81	12	1	412	139	5	8	..	..	1	2,884
March 17.....	Regular	49,882	3.86	3.67	7	6	331	91	18	8	2	..	..	2,732
	Militia	43,113	2.14	3.82	11	....	295	120	3	6	..	..	1	1,916

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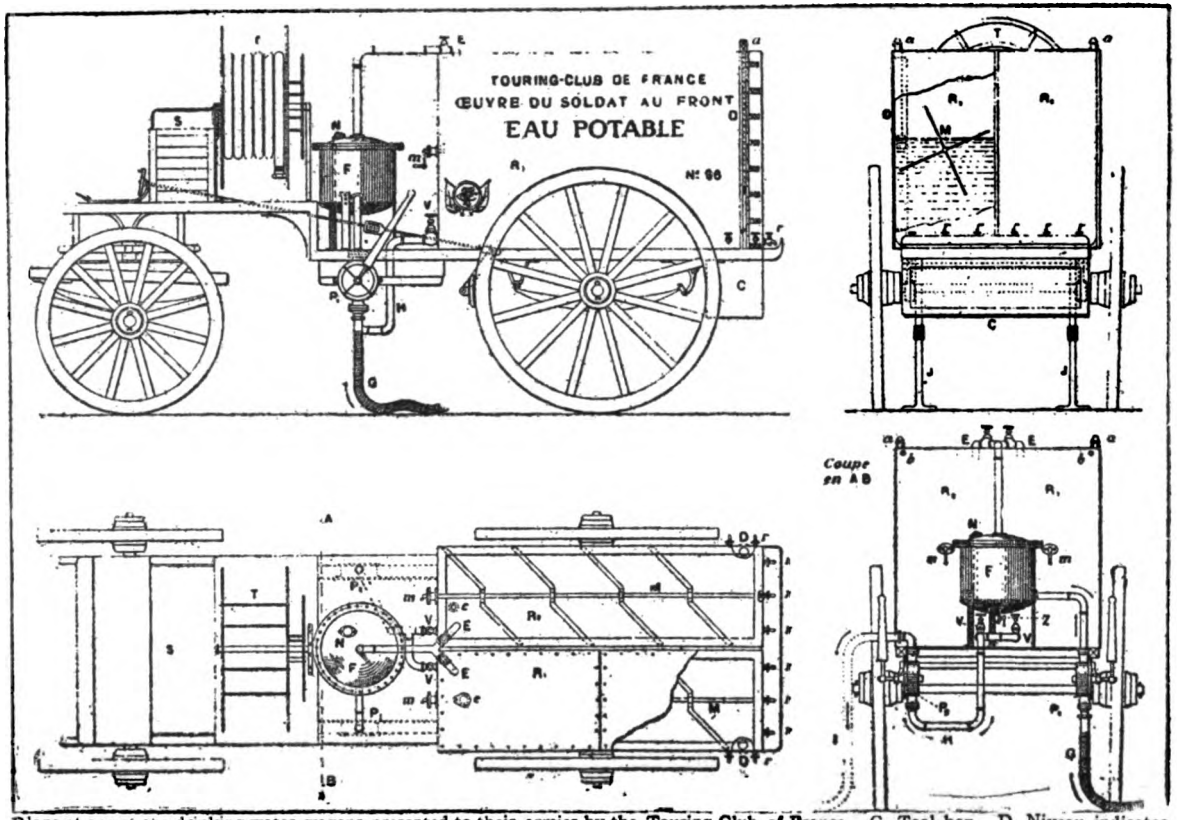

Plans of one of the drinking water wagons presented to their armies by the Touring Club of France. C. Tool box. D. Niveau indicator. E. Arrival of the water at the tanks after its passage through the filter F. G. Arrival of the water at the filter sucked up by the pump P_1. H. Discharging pipe of the sterilized water discharged into casks or distribution wagons by means of a second pump P_2. I. The water forced into the wagons. J. Cart-prop. M. Axes of the agitators. N. Cleaning orifice of the filter. R_1 R_2. The two tanks. S. Seat. T. Cylinder (drum) carrying the flexible tubing. V,V. Discharging cocks. a. Level index. m. Crank handle of the agitator. 2. Small cocks for individual water taking.

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PHYSICAL EXAMINATION OF LARGE BODIES OF MEN

By Colonel CHARLES WILLCOX
Medical Corps, United States Army

IN 1898 and in 1916 the Medical Corps was called on to physically examine many men. In both years the call was sudden and in both years speed was demanded that muster into the Federal service be accomplished quickly. Very few medical officers had had training and experience in physical examination other than the occasional examination of a soldier for reenlistment or a recruit for enlistment at their posts. A few had served at recruit depots and become familiar with their well organized work of examining from about fifteen to one hundred recruits daily. The examination of the Militia, prior to muster in, involved greater numbers and in most, if not in all, mobilization camps the medical officer assigned the duty of examination, was sent to camp after the arrival of the Militia and he then had to organize the personnel to conduct the examination, instruct them in the very rudiments of physical examinations—instil into them the importance of accurate records; then, and by no means was the going easy, he had to drive and steer his rapidly assembled and untried machine over slippery roads at a rate of speed only limited by the necessity of keeping the machine on the road. That the machines ran as they did, skidded only occasionally and arrived at their destinations in good time, showed the good material of which they were built and the ability of the reasonably carefully selected American to work in unaccustomed lines, when he is interested and enthusiastic. That these examinations were made in this manner was due to several simple factors. Our personnel, both commissioned and enlisted, had for years been only sufficient to do the necessary sanitary work for the Army; there was no large commissioned reserve to call on for the special work of physical examination. Officers had to be taken from any place where their services could best be spared; the enlisted personnel was even less available; mobilization in both years was sudden and from the midst of what had been profound peace and a sense of perfect security. All of which simply means we were unprepared for the work; this through no fault of ours, but from an insufficient number of trained men who could be assembled instantly and organized into efficient working groups for the different camps.

He who believes the physical examination of say 10,000 men, to select a moderate number, is a simple easy operation requiring only ordinary acumen in detecting physical defects and requiring no previous

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training or trained assistance for coördinated team work, would, if required to perform the operation, be as deserving of sympathy as would the novice who has to do it, and who thinks a tonsillectomy is as easy in the doing as rolling off a log.

Physical examinations may be broadly divided into two classes. (1) Complete and thorough, and (2) incomplete and slurred over; the intermediate degrees between these classes are infinite.

An examination made either carelessly, indifferently or ignorantly results not only in the acceptance of more or less poor material and the rejection of some good material, but results in the subsequent burdening of the Army with the poor material and in burdening the Federal treasury for years with those who take from it, having given nothing to earn what they take.

We have in the past had large bodies of men to examine—we may have them in the future. Whether we have or not it is wise to consider how we can prepare for a duty, that when it does come, comes often with little or no warning and with no directions except to speed it. It is at the suggestion of the Editor of THE MILITARY SURGEON that I have endeavored to submit some tentative working plan to prepare for the examination of large bodies of men. It is based on an experience in mobilization camps in 1898 and 1916 and service at a recruit depot. It is offered merely as a suggestion that can be modified and improved by the suggestions of others who have had like service or who may have given the subject any thought.

A call to arms may call (1) the National Guard of the States; (2) an increment to the Regular Army; (3) Volunteers. The National Guard has in the past been formed to some extent by men who enlisted without considering the possibility of war or of long service away from their homes, the majority of these men when trouble does come, accept it manfully and willingly and in many cases with a great sacrifice. Some, it must be said, show a very different spirit, and these present an interesting feature in the physical examination that I shall speak of later. Increments to the Regular Army and Volunteers are similar material for physical examination, but they desire to enter the service, and we therefore expect to find very few who will at the last minute endeavor to avoid service by malingering.

Theoretically all men in the National Guard before muster in are physically sound as they have been "critically examined" on enlistment. Practically many are very far from sound, for while the critical examinations have been made conscientiously and intelligently in many cases, in others they have been made in various degrees of inefficiency or not at all. It goes without saying that it would be a great initial benefit

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from every point if all national guardsmen had not only been thoroughly and properly examined physically, but had also been protected against smallpox and typhoid when enlisted. It would save valuable time, greatly reduce morbidity—and so add to the efficiency acquired by added military training at mobilization camps.

With seven medical officers to 1,000 authorized strength we would have sufficient trained officers to detail those essential for the proper sanitary administration of a mobilization camp. The camp surgeon who should not be connected with the physical examination, should reach camp before the troops arrive and all preliminary arrangements for the care of sick and for camp sanitation should then be made.

The physical examination must be under the direction of a trained medical officer and as the efficient carrying out of this duty will require all of his time, he should be able to devote himself to it alone. Training at a recruit depot is good preparation for such work and as examinations on a large scale may at any time be required, it would be advisable whenever practicable, to use the depots not only for recruiting but for the instruction of as many medical officers as it is possible to send. The instruction need not cover a long period, for the officer is by virtue of his profession able to physically examine an individual. The value of the instruction would lie in his becoming familiar with some tried system of organized work that calls not only for his own physical examination of a few men, but for the cooperation of assistants, enabling him to minutely examine not a few men but many men, and enabling him moreover to have all their records accurately made. Without such training even the most versatile man will experience trouble primarily, for he will have to work out a system, make many changes and modifications and will waste valuable time in developing his system, time that he would have saved had he previously been trained in this special work.

When many men are mobilized that they may be prepared for service, and when one part of this preparation is a physical examination, it is essential that the officer in charge of the examination be on the ground when the men arrive; not only this, but that he have his personnel organized for and instructed in the work they are to do, and that he have on hand all equipment necessary for the work; for if the personnel and equipment are not ready but have to be obtained later, there must be resulting delay. It is also essential for good smooth work that buildings be available. Men can be examined in tents, they have been, but the advantage of buildings is so great that if none are available they should be quickly erected; the expense is trifling compared with the gain. The buildings should be large, well lighted, have doors at both ends, a dark

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room, running water, tables and benches. During the days physical examinations are held, the buildings should be used for no purpose except physical examinations. Later they can be used for other purposes. The organizations to be examined must be reported according to a prearranged schedule that subsequently can be modified if conditions demand. If the men are not organized in companies, troops, etc., they must then be organized in groups, each under command of an officer, who will report his men on schedule time and be in charge of their discipline and orderly conduct during the examination, and who will have filled in the first part of the physical forms, having taken care that all entries are carefully and accurately made. These forms and a duplicate list of his men should be brought by him at the appointed time to the place of examination.

What personnel will be required for examining? This will, of course, depend on how many men are to be examined, daily. At Columbus Barracks with its present facilities, room space, and equipment, 100 recruits can be enlisted daily. This work, however, includes much more than the physical examination, and includes work that in a mobilization camp would be done by the senior mustering officer and by company officers, *e. g.*, the preparation of enlistment papers and beneficiary cards —it also includes the Wassermann test—identification records, and immunization against smallpox and typhoid. In a mobilization camp the immunization should be done under the supervision of the camp surgeon, either by a personnel detailed especially for the work, or by the medical officers attached to the units. To physically examine, prepare all records for, enlist, make identification records, do the Wassermann test and immunize 100 recruits daily, requires a personnel of three medical officers and sixteen enlisted men. A smaller personnel would result in the work dragging, in men working overtime and going stale. The personnel required for examination at a mobilization camp must be based on a much modified system.

Let us assume that it is necessary to physically examine a regiment, or in round numbers an average of 1,500 men daily. What personnel is necessary and how should it be organized that the work be done smoothly, rapidly, and above all, thoroughly and efficiently? I reported at a mobilization camp after the work of examination had begun; it was being conducted by six officers of the Medical Reserve Corps, all recently appointed, all unfamiliar with military methods, but all men who were successful and well known practitioners in civil life, who were physically fit, intensely interested, enthusiastic, and willing to do anything to help. They had evolved a good working system, and were making as thorough and perfect physical examinations as it was possible

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to make; but while the production of their work was excellent in quality, it was not large in quantity, they were examining about 100 men daily. This was due to the very natural professional interest shown by all, for when an unusual physical anomaly or defect was found by one, the others were greatly interested in seeing and discussing it. It was only necessary to modify slightly the system they had cleverly evolved, to increase greatly the output of the plant. It soon found itself and a week later was examining 700 and 800 men daily; this number could have been greater even, if there had not been delays due to company officers failing to collect all their men and report them promptly. These medical officers were men of more than ordinary ability, willing to do more than a hard day's work and it is safe to say their work was the maximum that can be efficiently done by this number of examiners.

It will be out of the question to detail as examiners men from the Regular Service only, it is a simple question of numbers and for the greater part of this work we must depend on our good allies in the Reserve; it may be rather strange work to some of them, but they soon strike their gait and run smoothly, they should be selected with due care and detailed for the work that their past training best qualifies them. This applies especially to examination of the feet, eyes, and ears, nose and throat. If possible, a dental surgeon should be a member of the force; if one is not available the teeth form part of the mouth examination. Preliminary to the examination the officers conducting it should be advised on malingering; many men in civil practice see little of this moral obliquity in their patients and so may not suspect it. An examiner reported that several members of the ..... Band were deaf; these men had just been found by the eye examiner to have total loss of vision in one eye with markedly defective vision in the other. Further examination revealed still more defects; they had lumbago, sciatica, shortness of breath, could not hop, etc. All other members of the band were similarly unfortunate. Looking at their answers to questions on their physical forms most were seen to be "not sound and well" and to be afflicted with serious diseases. However, I took a chance and waived blindness, deafness, epilepsy, paralysis, etc. The band was an unusually good one, played splendidly for weeks thereafter in camp, but eventually I believe nearly all were discharged on account of dependents. The eye examiner especially must be on his guard, test cards must be constantly changed and the applicant must be made to quickly call letters in various positions on the cards. It is so easy to memorize the lines and pass the memorized letters on to others. If the same card is used daily, the vision test from this alone is worthless. On the other hand a marked defect in vision must not be accepted until proved by the

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retinoscope or ophthalmoscope. Another fraud frequently attempted is substitution, where one applicant will temporarily change place with another or will even appear under the name of a comrade. The preventing of this fraud must be accomplished through supervision by the company officers and by severe and prompt punishment when detected.

Examinations may be conducted by having medical officers examine the entire body in smaller groups or by having them examine a special part of the body in larger groups; the latter is the better way since it permits the selection of examiners for the work they are best qualified for, and the examination is more consistent and better standardized. No one part of the body is slighted by a man who lays more stress on another part. By dividing the body between different men, each man is particularly interested in the part assigned him, with the result that every part receives the careful consideration due it. An examiner becomes more skilled in his special work as it progresses and no part of the body is neglected. The examining force being assigned its special duties, it is not wise to insist that the work be carried out in the exact manner first contemplated. It may be found that one man works much faster than another and, as the examination can proceed at no faster gait than the gait of the slowest man, the slowest man will have to be forced to greater speed, or a faster man will have to cover part of his work. As with a base-ball team, the manager, to obtain the best team-work, will have to make one of his fielders cover the edge of the territory of his adjoining fielder and he may even find it works better to switch basemen around. It is important for the officer in charge to watch his team carefully, especially in the beginning, to keep every one working at the same rate and get the greatest speed and the best results from all. The team must not be started with cast iron inflexible rules, but must be juggled until the best working combination is found. In handling the team, if due consideration is given to the temperament of each member, better results will follow; some men require driving and others careful leading. Showing appreciation of work well done, will get more and better results than will an indifferent acceptance of it as a duty that a man must perform and for which he deserves no notice. I don't care who the man is, if he knows his work is appreciated he will do more and better than he who thinks no one cares what he does as long as he does it. This applies especially to the clerks who have the long daily grind of making entries on Form 135, formerly Form 10. Their service to their country is very like that of the scrubs to their Varsity, trying and full of hard knocks. Encouragement and appreciation, and making them realize their work is an important link in the chain, will add wonderfully to their spirit, and what is of vital importance, their

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accuracy. This little, very human attribute is not always taken full advantage of as it should be. I can vouch for its value, for I know it has been a tremendous factor in making a green team play with splendid spirit and it was this spirit that made latent talent get there promptly. Even a team of veterans is not immune to the same influence, for its judicious application adds to their trained efficiency the spirit that is needed. This phase of the question under consideration may seem to be out of place, where system alone seems important. It is not out of place and its aid should never be ignored, but should be sought and used to the limit.

A regiment may be examined by one of several systems or by a modification of or combination of several. Whatever method is adopted it is advisable to first examine as many officers of the regiment as possible, this to enable them to subsequently oversee the discipline of their units during the examination of the enlisted men. If the examination of one company is to be carried through uninterruptedly, one officer should be with the first company to be examined and, instead of being examined with the officers as a body, should be examined with his company. This will enable the first company to follow without delay the group of officers first examined.

It is essential that Forms 135 A. G. O. (Report of Physical Examination) be properly filled out as to name and accepted .....at..... on page 1, answers to questions on pages 2, 3, and 4, and signature on page 4. This much of the form must be accomplished and the forms and duplicate lists of names must be brought to the place of examination and presented with each group to be examined. Absentees should be noted on a separate list attached to the list of names. The adjutant should bring the forms of the officers and the band, company commanders those of their companies. The medical officer in charge of the examination should make it one of his first duties to procure whatever rubber stamps can be used to make entries on the form. This will save a great deal of time and labor required by making these entries with pen or typewriter. When being examined the commanding officer of the company will keep his men in their proper order, this order will be maintained throughout and will be in the order of the names on the duplicate lists, *i. e.*, by rank alphabetically. No straggling will be allowed.

A regiment may now be examined (1) by having a number of companies begin the examination at the same time; one company having its men's vision tested, another hearing, another chest, another height, weight and measurements, etc., according to the number of groups into which the examining force is divided; or (2) by having one company

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report at a time, the other following in order. Maj. F. Schmitter, M. C., U. S. Army, who has had a great deal of experience in physical examinations, and who is a very rapid examiner, tried out the first method last summer and says that it proved very satisfactory after his force became familiar with the work. He had Company A report to one examiner in Mess Tent A, Company B to another examiner in Mess Tent B and so on to six examiners in all. When a company had been examined in one tent it was marched to its company street and held until directed to report to another tent. His scheme as he worked it out was ingenious and prevented loss of time, as every examiner worked steadily. A company was always ready for his call when he had completed a company. To administer this system requires a guiding hand and a train dispatcher's watchfulness and skill. It also assumes a well trained team, each group able to work independently. With a good guiding hand, a cool watchful head to prevent a possible mixup or delay, and a well-trained and practiced personnel the system should prove an excellent one.

When the examination of one company is carried through uninterruptedly to completion and is followed by the examination of other companies, it will be possible for one group of examiners to examine approximately half a regiment a day; to examine a regiment a day, two groups will be required.

The personnel as shown in table on page 419 is proposed:

This personnel is based on the assumption that it is required to thoroughly and carefully examine a regiment a day. At first glance it may appear excessive, but if it is reduced it will only result in the examination of less than a regiment, or in a lessening of the care and thoroughness of those examined, if a regiment a day is shoved through. If this personnel is cut down it will necessitate the medical officers and clerks doing more than the work above assigned. For instance, one medical officer can take the eye, ear, nose, throat and teeth—another the rest of the body—this will give as good results as far as quality is concerned, but the output must be greatly reduced, and the entire regiment cannot be examined.

The officer in charge exercises general supervision, decides doubtful cases, requests waivers for defects if he has not been given authority to waive, or if a board has not been appointed to act on these cases, sees that necessary supplies are on hand and makes such reports as may be required. In supervising the examination he must see that there is no hitch; if one man is working faster than another, and both are duly careful and thorough, he should give the faster man a part of the slower man's duty and he will soon find what combination produces the more rapid and even flow.

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Administration		Commissioned	Enlisted
1 Medical officer, U. S. Army, in charge		1	.....
1 Noncommissioned officer, Medical Department, U. S. Army, correspondence and records		.....	.....
1 Private, Medical Department, U. S. Army, orderly		.....	2
Examining force:			
Group 1	Group 2		
Height, weight, chest measurements			
1 Noncommissioned officer to take measurements and weight	Same	.....	.....
1 Private, clerk		.....	4
Vision and hearing			
1 Medical officer, U. S. Army, or Reserve Corps		2	.....
1 Private, assistant	Same	.....	.....
1 Private, clerk		.....	4
Ear, nose and throat			
1 Medical officer, U. S. Army, or Reserve Corps		2	.....
1 Private, assistant	Same	.....	.....
1 Private clerk		.....	4
Teeth			
1 Dental surgeon, U. S. Army, or Reserve Corps		2	.....
1 Private, assistant	Same	.....	.....
1 Private, clerk		.....	4
Doubtful cases requiring eye examination in dark room, or further tests of hearing			
1 Medical officer, U. S. Army, or Reserve Corps	Same	2	.....
1 Private, assistant		.....	2
Genito-urinary, hernia, anus, varicose veins			
1 Medical officer, U. S. Army, or Reserve Corps	Same	2	.....
1 Private, clerk		.....	2
Skin, goitre, glands, reflexes, bones, joints, feet, hands			
1 Medical officer, U. S. Army, or Reserve Corps	Same	2	.....
1 Private, clerk		.....	2
Chest, heart and lungs, head, tremor			
1 Medical officer, U. S. Army, or Reserve Corps	Same	2	.....
1 Private, clerk		.....	2
To receive and care for forms 135 and to check names on duplicate lists			
1 Private	Same	.....	2
To examine Forms 135, note errors or discrepancies and to sign forms			
1 Medical officer, U. S. Army	Same	2	.....
Total		17	28

The duties of the examiners are evident and require no explanation. The clerks make on the forms for physical examination the entries directed by the examiners. The assistant for vision and hearing changes test cards, points rapidly to different letters in the various lines, and either speaks and whispers for testing hearing, or closes one ear of the man examined while the examiner speaks and whispers. The other

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assistants clean and care for the instruments and appliances used in the special examinations.

The dental surgeon is an important member of the examining force and the necessary number should be detailed for these physical examinations. The hard and fast rules concerning teeth should be modified and the officer in charge, with the dental surgeon, should be given wide latitude in using judgment as to accepting or rejecting. There are many men of unusual physical strength, endurance and good health who are sadly deficient numerically in teeth, but they have firm tough, healthy gums and with their few teeth, assisted by powerful digestive aids, have for years assimilated any food and are men who will prove to be excellent material in the field. Teeth should be considered not alone, but in conjunction with the gums, the condition of the mouth, and especially the general condition of the man and what he has proved himself to be.

The examination of the heart and lungs is made after the exercise incident to the examination of the function of the joints, especially the ankle.

It is assumed that the examination of a regiment is to be completed as soon as possible, including all papers. The examination of and signing of the physical form is a very important part of the examination and a part that takes a great deal of time. If the officer in charge has this duty he cannot, without neglecting other important work, sign or examine these forms every day. He will either have to delay them until all the examinations are finished, or work on them from time to time when he can. There should, therefore, be one experienced officer to examine and sign the forms of each group.

During the examination each man carries his physical form blank on which the proper entries are made as he passes along. At the completion of the examination his form is given to the clerk whose duty it is to receive and care for these forms until turned over to the officer who completes them. Men held for further examination have "held" slips attached to their cards, these slips indicate the reason for holding and the men may be sent to the hospital for observation or held in their companies. A final decision should be made by the officer in charge as soon as it is possible, and the "held" list should not be allowed to become large. A few cases it will be advisable to hold some time, to enable the officer to determine the true condition, but most cases can be acted on very soon, especially if observed in a hospital. If there are many of these "held" cases it will be advisable to examine them in a group.

The personnel given above is that required for the physical examination only. If in addition to the physical examination it is necessary to

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make identification records, an additional personnel is required. The clerical work requires only accuracy and requires no special training. Photography and finger print work on the other hand can only be done satisfactorily by men trained in the work. Taking finger prints involves working in rather constrained positions and involves, therefore, considerable physical strain. Identification work by its very purpose demands absolute accuracy; good negatives and plain and distinct finger prints. The personnel necessary to make 1,500 records a day is based on what experience shows men can do without undue strain and do satisfactorily. As no one man can do his part of the work for 1,500 men, it is necessary here also to have additional groups with this personnel:

		Commissioned	Enlisted
1 Noncommissioned officer, photographer	Three	.....	.....
1 Private to write names, etc., on slates	additional	.....	.....
2 Privates to develop and print	groups	.....	.....
1 Private to place negatives and prints in jackets and mark same	with same personnel	.....	20
1 Private to take finger prints	Nine	.....	.....
1 Private to wash and dry fingers	additional	.....	.....
1 Private, clerk, to enter scars and marks and fill in briefs on Form 260	groups with	.....	.....
1 Medical officer to examine and pass or reject records and to sign same	same personnel	1	30
Total	.....	1	50

Some photographs will not be satisfactory and will have to be taken again, best on the day following. Wounds and injuries of the face may make it necessary to wait a longer time. When so many men are being examined it would be advisable to have authority to pass finger prints that fall only slightly below the standard. Frequently one finger will have a temporary defect that obscures the lines and it may require weeks before the lines will be clear. If sufficient fingers show distinct lines and the record suffices for identification it would be better not to "hold" the print indefinitely—when many or all fingers are unsatisfactory another print is unquestionably necessary, and its making will have to be delayed possibly for several weeks.

It is not probable that Wassermann tests will be made at mobilization camps. It requires laboratory equipment and medical officers carefully trained to make the test and properly interpret it. To do it on 1,500 men a day would probably require:

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7 medical officers.
14 noncommissioned officers or privates to collect blood.
8 privates (7 clerks, 1 private, to care for animals).

Six groups could make 1,500 tests daily for a shorter period and five groups could make them for a few days, but for work over a longer period a group should not be called on to make many more than 200 tests a day.

The personnel required to immunize recruits against smallpox and typhoid fever will not be considered, as this immunization is properly part of the preparation of the recruit that follows his physical examination.

No further merit is claimed for the method of physical examinations suggested in this article other than that it has been tried and found rapid, thorough, and satisfactory. Further experience will doubtless show what modifications or changes will make it better. No directions for conducting the medical examination have been given, as specific instructions are laid down in official orders. For details of this examination the reader is referred to an article by Major Woodbury appearing in a recent number of THE MILITARY SURGEON.[1]

A medical officer detailed for administrative duty of any nature at a mobilization camp should expect and should be prepared to meet and solve a few broad problems, for he will surely encounter them. It will unquestionably be hard and trying work, often under adverse conditions, with green material and possibly a lack of certain supplies that he may at first glance deem essential; but by making the most of what he has he can, by ordinary common-sense, ingenuity, persistence and perseverance, get along surprisingly well with what seemed to him, in the beginning, very frail assistance.

The examination of a large number of men and of boys, for many recruits are irresponsible boys, will occasionally reveal some little pathos; it will more often reveal true humor and will always involve hard work. The work of examiners and those on other duty at mobilization camps will, if gone at in the right way and the right spirit, prove an experience not only of great value to the country but one that ever after will be looked on with the pleasantest personal recollections.

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[1]Vol. xl, pp. 17 and 195.

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THE OCCURRENCE OF ENDAMEBIC DYSENTERY IN THE TROOPS SERVING IN THE EL PASO DISTRICT FROM JULY, 1916, TO DECEMBER, 1916

By Major CHARLES F. CRAIG
Medical Corps, United States Army
(From Department Laboratory No. 2, Southern Department, U. S. Army, El Paso, Texas)

(*Concluded from March*, 1917)

The Influence of "Carriers" on the Spread of the Epidemic.—It is now well known that it is not the patient sick with acute symptoms of endamebic dysentery who is the greatest source of danger to the uninfected but the apparently healthy individual, or one who has recovered from the acute attack, but who is carrying cysts of *Endameba histolytica* in his stools. Such individuals are a potential source of infection wherever they may go, and the discovery, isolation, and treatment of these "carriers" of the disease becomes of paramount importance in prophylaxis.

As already noted, the cystic stage of *Endameba histolytica* is the chief agent of infection in this disease, for while the vegetative motile forms may produce infection when ingested, the evidence is conclusive that in both man and animals the ingestion of cysts is followed by infection in the vast majority of instances, although only a small proportion of those becoming parasitized develop the symptoms of endamebic dysentery, if Walker's work, already quoted, is applicable to natural infection, for he found that while fourteen of sixteen men who ingested cysts of this parasite, or 85.5 per cent, showed the organism in the feces after a few days, only four of these developed dysentery, the remainder becoming "carriers" of the infection.

Cysts of *Endameba histolytica* occur in chronic infections; in cases in which treatment has not resulted in the destruction of all the endamebae; and in apparently healthy individuals who have never presented symptoms of dysentery. For the latter class the name "contact carrier" is suitable, while for those individuals who develop cysts during convalescence from an acute attack of endamebic dysentery the name "convalescent carrier" is used. The "convalescent carrier" is very common following any epidemic of endamebic dysentery, but it is probable that "contact carriers" of the infection, *i. e.*, those who have never had the disease but who show cysts of *Endameba histolytica*, are also numerous, for in Walker's experiments he found that 75 per cent of persons parasitized with *Endameba histolytica* became carriers of the infection, although no symptoms were produced and he says:

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For every case of dysentery obtained in these experiments there were five cases of latent infection (carriers)—and in the examination of 101 healthy men in Bilibid Prison, who had not been used for the experiments, nine, or 8.9 per cent, were found to be "carriers" of *Endameba histolytica* (page 321).

My own observations during the epidemic under consideration confirm Walker's findings. Through the interest and energy of First Lieut. Loyd Brinton, M. R. C., U. S. Army, I was able to examine the stools of fifty-five men belonging to the truck companies, who were apparently healthy and who denied ever having had symptoms of dysentery. Of these men, five, or 9 per cent, were found to be "contact carriers" of cysts of *Endameba histolytica*. As soon as discovered these men were placed under treatment in hospital, and their removal from the Truck Trains Camp resulted in endamebic dysentery practically disappearing from this camp.

It is thus evident, as shown by the human experiments of Walker and the personal observation quoted, that healthy individuals may continually excrete the cysts of *Endameba histolytica* without symptoms of the disease appearing, and that the presence of these cysts is not sufficient to prove that any lesion of the disease has occurred in the infected intestine. Such individuals are true "carriers" of endamebic dysentery and are undoubtedly the most dangerous of all sources of infection, owing to the fact that, there being no history or symptoms of the disease present, they are absolutely unsuspected and would only be discovered by the examination of the feces of all healthy individuals in a command.

That the endamebae present in this class of "carriers" are not avirulent but are fully capable of producing dysentery has been experimentally proven by Walker (*ibid.*). He produced typical endamebic dysentery in a man who had swallowed cysts of *Endameba histolytica* obtained from another man who was a "carrier" of the infection. This strain of the parasite is thus described by Walker:

Coming originally from a man convalescent sixty days from a slight attack of endamebic dysentery, it has been passed through men 29 and 36. Man 29 had been parasitized with this strain for 161 days, without the development of dysentery, when it was passed through man 36. Man 36 had been parasitized 121 days with the strain, without the development of dysentery, when it was used for the present series of experiments. Neither man 29 nor 36 has subsequently developed symptoms of dysentery although both have shown cysts of *Endameba histolytica* more or less constantly in their stools up to the present time (page 296).

In another instance, Walker was able to produce the disease in man through the ingestion of the cysts of a naturally parasitized "carrier" of *Endameba histolytica*. Regarding his successful experimental cases he says:

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On the other hand, all the experimental dysenteries were obtained after ingesting *Endameba histolytica* from healthy persons who were "carriers" of the parasite. Case 2 developed dysentery after ingesting *Endameba histolytica* from a man convalescent fifty-nine days from a slight spontaneous attack of endamebic dysentery, who had not subsequently shown any symptoms of dysentery, and who was, therefore, a "convalescent carrier" of *Endameba histolytica*. Case 30 resulted from the ingestion of material from the same carrier convalescent 161 days. Case 39 suffered an attack of endamebic dysentery after ingesting *Endameba histolytica* obtained from a person who had not, and has not subsequently, developed dysentery; that is, a "contact carrier." And case 41 developed endamebic dysentery after ingesting *Endameba histolytica* that had been passed through two "contact carriers." The history of this strain of *Endameba histolytica* is as follows: It was originally obtained from the same "convalescent carrier" from whom cases 2 and 30 were infected. *Endameba histolytica*, from this "carrier" convalescent fifty-nine days, was ingested by man 29, who became parasitized, but did not develop dysentery. *Endameba histolytica* from this "contact carrier," 121 days after infection, was next ingested by man 36, who likewise became parasitized, but did not develop dysentery. Finally, *Endameba histolytica* from this second "contact carrier," 134 days after infection, was ingested by man 41, who became parasitized with *Endameba histolytica* and developed endamebic dysentery after fifty-seven days. Therefore, 371 days and the passage through two "contact carriers"—who had not, and have not subsequently developed dysentery—separated this experimental case from the spontaneous case of endamebic dysentery, a gap bridged by innumerable and continuous generations of *Endameba histolytica* in four different men (page 306).

I have quoted extensively from Walker's work because it definitely proves that the endamebae found in "carriers" of this disease are virulent and able to produce the disease even after passing through several individuals without producing any symptoms of dysentery.

The length of time during which the cysts of *Endameba histolytica* may persist in the stools of "carriers" has not been determined, but it certainly covers months and probably, years. I have myself found them present in "carriers" observed here for as long as period as five months and Walker has found then after a year. Further research along this line is required before this interesting and important question can be settled. As regards "convalescent carriers" it may be stated that, even with the most energetic treatment with emetine hydrochloride, a very large percentage of patients suffering from endamebic dysentery develop the cysts of *Endameba histolytica* and become "convalescent carriers" of the disease. The following data obtained by personal examinations of the stools of the cases originating here and in the Punitive Expedition in Mexico, are of interest and importance in this connection.

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In the vast majority of patients suffering from this form of dysentery I have made at least weekly examinations of the stools and it has been the rule at Base Hospital No. 2 to return no patient to duty until three negative results of stool examination have been obtained, at daily or two-day intervals. It has been possible in this way to obtain accurate data regarding the percentage of cases that have developed cysts and the effect of treatment upon these cysts carriers.

Of the total cases, 156 in number, 21 had already developed cysts upon admission to Base Hospital No. 2. These included 7 "contact carriers" of the disease, the remainder being patients who had suffered from acute attacks of endamebic dysentery and had been treated before reaching Base Hospital No. 2. Of the remaining 135 cases, 65 developed cysts despite thorough treatment with emetine hydrochloride, or 48 per cent. Adding these 65 patients to the 21 who were already cyst carriers when they reached the hospital, we have a total of 86 patients who developed cysts despite treatment, or 64.4 per cent of the cases. However, this is not a true index of the actual number of "carriers" which might develop from the 156 patients, for of the 70 negative cases there were 41 who were not examined for a sufficient length of time to be sure that cysts would not have appeared (in most of these cases only one or two examinations were made). If these uncertain cases be subtracted from 156 under discussion, we have 115 patients, of whom 86 developed cysts of *Endameba histolytica*, or nearly 75 per cent (74.7 per cent).

In these patients the vast majority developed cysts within two or three weeks after treatment and in almost all of them emetine hydrochloride, even when given in grain doses for twelve or more doses, failed to eliminate the cysts. Of the cases observed here, cysts have persisted despite treatment during one month in thirteen cases; for two months in ten cases; for three months in twelve cases; for four months in four cases; and for five months in six cases, and at the present writing all of these patients are still positive for the cysts. The remaining cyst carriers have not been observed for as long as one month.

As all of these individuals, though cured of the symptoms of dysentery by the treatment given, are now potential agents of infection, *i. e.*, "convalescent carriers," one may imagine the result had they been returned to duty as soon as their symptoms disappeared, as was the custom until quite recently. Eighty-six "convalescent carriers" of endamebic dysentery would have been turned loose in the camps and the epidemic of dysentery, under favorable conditions, would have been given an impetus that it would have been difficult to combat. Fortunately, the utmost care has been taken in this respect and

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it is not believed that many of these carriers have been returned to duty while the cysts were numerous enough to give rise to much infection.

My observations regarding the percentage of patients that become "convalescent carriers" of endamebic dysentery are confirmed by the work of others, and in a recent paper Dobell (*British Medical Journal*, 1916, No. 2914, p. 612) states that of 200 soldiers examined for *Endameba histolytica* as a routine measure, no less than twenty-two, or 11 per cent, were infected with this parasite, one half of which number denied any history of diarrhea or dysentery. Among these same 200 men, four undoubted "contact carriers" were discovered.

The significance of these facts in the prophylaxis of endamebic dysentery must be apparent and the "carriers" of this disease become as important a factor in its epidemiology as the "carriers" of typhoid, paratyphoid, bacillary dysentery, or cholera. It is my belief that this epidemic of the disease had its origin in "carriers" of the infection and that it was transmitted by flies. Any one who has had experience with the examination of the stools of either "contact carriers" or "convalescent carriers" of this infection, cannot fail to be impressed with the great danger that these individuals are to a community where conditions favorable for the transmission of the infection exist, for their stools frequently swarm with the cysts of *Endameba histolytica* and I have repeatedly observed instances where from six to eight cysts have occurred in every microscopical field.

Treatment of "Carriers."—From the examinations we have made of the stools of individuals showing cysts it has been our experience that it is extremely difficult to get rid of them by any method of treatment we have seen used for this purpose. The statement of certain English authorities that a course of 12 grains of emetine hydrochloride, in 1-grain daily doses, is sufficient to prevent the development of cysts and to cause the permanent disappearance of cysts in "carriers" of the infection, are, from our experience, gross exaggerations of what this drug can do in the treatment of endamebic dysentery, and hold out false hopes of the cure of the infection. It is not believed that anywhere in the world has emetine been more thoroughly and extensively used in the treatment of this disease than it has in Base Hospital No. 2. Not only has a single course of 12 grains of the drug been given, as advocated, but this course has been repeated in not a few instances, but despite this thorough treatment no less than sixty-five of 115 patients treated at Base Hospital No. 2 developed cysts of *Endameba histolytica* and became "convalescent carriers" of the disease. The treatment of these carriers with the same drug has resulted in curing but four cases that have been

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observed for as long as two months since the cessation of treatment, or slightly over 6 per cent.

That the standard of three negative examinations of the stools before sending a patient to duty is insufficient to prove that the cysts have disappeared is shown by numerous instances in which this form of the parasite disappeared for weeks at a time, but afterwards was found in the feces. It has been our experience that the motile forms and cysts generally disappear from the stools by the time 12 grains of emetine hydrochloride, in daily doses, have been administered, but the cysts almost invariably reappear and, as has already been shown, this treatment does not prevent the development of cysts in a large proportion of the infections. The fact that following treatment with emetine the motile forms and cysts may disappear from the stools within a short period of time, is no proof that the infection is really cured, for examinations made at a later date often result positively. The following cases illustrate this point:

Case 1. D. G. On September 17, 1916, this man was sent to the hospital with typical symptoms of dysentery and numerous motile *Endameba histolytica* were found in the stools. After the course of treatment with emetine hydrochloride, the endamebae were found to have disappeared on October 1, 1916. Between this date and November 16, 1916, a period of six weeks, six examinations were made of the stools, and no endamebae were discovered. However, on November 27, 1916, cysts of *Endameba histolytica* were found in the stools and have persisted despite treatment with emetine, until the date of the last examination, December 21, 1916.

Case 2. C. D. On November 11, 1916, the feces of this soldier were found to contain numerous cysts of *Endameba histolytica*. Two courses of emetine hydrochloride, each of 12 grains have been administered since that date, but every one of the four examinations of the stools have shown cysts in practically undiminished numbers.

Case 3. H. C. This soldier was admitted to hospital October 1, 1916, with symptoms of endamebic dysentery, and upon October 7, 1916, his stools were found to contain motile *Endameba histolytica*. The usual course of emetine hydrochloride was given and the endamebae disappeared from the stools upon October 22, 1916, and another examination upon November 2 was negative. However, upon November 10, 1916, the stools were found to contain cysts and the treatment was repeated. Despite the treatment all of the four examinations made since November 10 have shown numerous cysts of *Endameba histolytica* in the stools, the last examination being made upon December 13, 1916, one month since the cysts were first discovered.

Case 4. R. S. C. This soldier was admitted to hospital September 17, with endamebic dysentery and motile *Endameba histolytica* were found in the stools on September 20, 1916. The usual course of emetine was administered and the endameba disappeared from the stools upon October 3, 1916, and

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remained absent until November 6, 1916, when cysts of *Endameba histolytica* were found. Treatment was repeated but the stools have remained positive for cysts ever since, the last examination being made upon December 16, 1916.

Case 5. A. H. This man was a "contact carrier" of endamebic dysentery, his stools showing numerous cysts of *Endameba histolytica* when admitted to hospital on October 27, 1916. The usual treatment with emetine hydrochloride was given and the cysts disappeared from the stools on November 18, 1916, and remained absent until December 7, when they reappeared and have since continued despite treatment.

Case 6. R. E. B. This soldier was admitted to hospital on August 25 with endamebic dysentery, and on the same date his stools showed numerous motile forms of *Endameba histolytica*. He was given the usual emetine treatment, but the endamebae persisted and on September 4, 1916, cysts of *Endameba histolytica* appeared in the stools. On September 18, however, the stools were found to be negative and remained so until November 10, when cysts were again found. The stools again became negative on November 27, after further treatment with emetine and remained so until January 8, 1917, a period of five weeks, when cysts of *Endameba histolytica* again appeared in the feces.

Case 7. M. G. This soldier was admitted to hospital with endamebic dysentery on September 1, 1916, and his stools were found positive for *Endameba histolytica* on September 4, only motile forms being present. The usual treatment with emetine hydrochloride was administered and the feces became negative for endamebae on September 11, 1916, and remained so until November 9, four examinations having been made meanwhile. On November 9, 1916, cysts of *Endameba histolytica* were found in the stools but disappeared by November 16, upon further treatment with emetine. From this date until January 8, 1917, the stools remained negative, four examinations being made. On January 8, 1917, cysts of *Endameba histolytica* were again present in the stools.

These are but a few of many cases in which the most strenuous treatment with emetine hydrochloride has not prevented the development of cysts of *Endameba histolytica* nor removed them permanently after they have developed. I have records of but four instances in which treatment with emetine has succeeded in causing the disappearance of the cysts for as long a period as two months, of a total of sixty-five "convalescent carriers" of *Endameba histolytica*, although the majority of the cases have shown intervals of days or even weeks, during which the cysts had apparently disappeared. It should be remembered, however, in considering these results, that, owing to pressure of work, it was only possible, in most instances, to examine a single preparation from each man at each examination, and it is undoubtedly true that had several preparations been examined, cysts would have been found continually in many of these cases. The evidence is clear, however, that wherever in the intestine the cysts are formed, whether

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upon the surface of the mucous membrane or in pockets caused by the invasion of the parasite beneath the mucous membrane, there are certain periods in which they are much more numerous than at others, and sometimes there appears to be a veritable shower of cysts, every preparation being loaded with them.

The facts given are sufficient to prove that emetine hydrochloride does not, even when given in repeated courses of 12 grains, 1 grain daily, cure many cases of endamebic dysentery, if by cure is meant the destruction of all of the endamebae, and that it does not prevent the development of cysts in the majority of cases, nor cure either "contact carriers" or "convalescent carriers" of the disease. The drug has a wonderful effect upon the acute symptoms of the disease, causing them to disappear in most instances within a few days after its administration, but, even when given until toxic symptoms appear, it does not actually cure the infection or prevent "carriers" save in a very few instances.

These conclusions regarding the efficacy of this drug are borne out by the observations of many recent authorities. For instance, Dobell (*ibid.*) found that of twenty-one cases of endamebic dysentery given from 12 to 14 grains of emetine hydrochloride in daily doses of 1 grain, no fewer than fourteen or nearly 66 per cent were not cured of their infection, and that of the fourteen, no less than five showed no improvement whatever. His experience with the others was the same as my own, the cysts disappearing for a time only to reappear after several days or weeks. He also calls attention to the fact that negative examinations made during or immediately after treatment are not reliable as indicating cure and that a system which relies upon three negative examinations after the course of treatment is completed before returning the patients to duty is faulty because so many of these cases show cysts at a later date.

In many of the infections, massive doses of bismuth subnitrate have been administered in conjunction with emetine hydrochloride or alone, and it has been my experience that when this drug is given to the extent that the stools are tar black in color, the cysts of *Endameba histolytica* rapidly disappear from the stools and it is generally impossible to demonstrate them in such a stool. However, cessation of the treatment appears to be generally followed by a reappearance of the cysts, as with emetine alone.

The recognition of the fact that emetine hydrochloride, while efficient in subduing the symptoms of endamebic dysentery, is seldom followed by a cure of the infection, has stimulated search for some more efficient treatment, and recently several English authorities have highly praised the curative action of emetine bismuth iodide, a drug

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first brought to the attention of the profession by Du Mez (*Philippine Journal of Science*, Sec. B, 1915, x, 1, p. 73) of the school of pharmacy of the University of the Philippines. Low and Dale, in recent articles (*Journal Royal Army Medical Corps*, 1916, xxvii, 2, p. 241) have reported very favorably upon the use of this drug in the treatment of "carriers" of endamebic dysentery, given by mouth in doses of from 2 to 5 grains daily until from 30 to 36 grains have been taken, and Dale suggests its use as a prophylactic in troops in regions where the disease is endemic, using one grain at intervals of three or four days. According to Du Mez's analysis, the drug contains 58 per cent of iodine, 12 per cent of bismuth, and 29 per cent of emetine. It is generally well borne, although it frequently causes slight nausea, and should be given on a full stomach. Sometimes it causes vomiting but it is recommended that, if possible, the use of it be persisted in, as tolerance is quickly established, generally within two or three days.

Dobell (*ibid.*), who has used the drug, is very enthusiastic in its praises. He treated eleven men who were resistant to treatment with emetine hydrochloride and who showed cysts in their stools continually, by giving them 1 grain three times a day of emetine bismuth iodide, until 36 grains were taken, and he states that in every case the cysts disappeared within a few days and have not since reappeared although many examinations have been made covering over two months, in some instances. He says:

> Within four days of the commencement of the treatment all stages of *Endameba histolytica*, whether amebae or cysts, have completely vanished from the feces, and in no single instance have they been subsequently found. When it is remembered that some of the cases had been found to be passing cysts in large numbers almost every time they had been examined previously—for weeks and in some cases for months—it will cause no surprise when I say that the result of the double iodide treatment have appeared to me astounding.

From the reports mentioned, and others, it is evident that the double iodide of emetine and bismuth, or emetine bismuth iodide, merits a very careful trial in the treatment of endamebic dysentery and especially in the treatment of "carriers" of *Endameba histolytica*.

As a result of the experience gained in the hundreds of examinations made of the stools of patients suffering from this disease during this epidemic, I am convinced that at the present time, with the possible exception of emetine bismuth iodide, we have no drug that will prevent the majority of patients suffering from endamebic dysentery from becoming "carriers." As these individuals are the great source of infection during every epidemic, I believe, that so far as the military service is

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concerned, the best method of dealing with them is to discharge them, where conditions are such that it is impossible to properly care for their excreta or to protect food from flies. While this may seem a very drastic measure, I believe that it will be found the only way in which epidemics of this disease can be prevented in temporary camps or where conditions are favorable for infection. In permanent camps and cantonments, where there is a protected water supply, proper sewage disposal and screened barracks and mess halls, "carriers" of endamebic dysentery would be practically harmless, but in camps where flies are abundant, mess tents or rooms are unscreened, and sewage disposal is in latrines, these individuals are a constant source of danger. There is no doubt in my mind that "carriers" were responsible for the epidemic at El Paso and that flies transmitted the infection, and where conditions are similar to those obtaining in the camps at El Paso during this epidemic, I believe the separation from service of soldiers shown to be "carriers" of this form of dysentery would be for the best interests of the military service. Experience has shown that, by the methods of treatment employed here, very few patients who develop cysts of *Endameba histolytica* and become "carriers" of the infection have been cured, even after weeks and months in the hospital, and the consequent loss to the Army of the services of these men, and that the vast majority of patients suffering from endamebic dysentery do become "carriers" of the disease. Thus, from the standpoint of economy, as well as safety and efficiency, the discharge of "carriers" of this infection from the service is justified. Of course, if the new treatment with emetine bismuth iodide proves successful in removing the cysts of *Endameba histolytica* from "carriers," the problem will be solved, but until this or some treatment does do this, I believe that endamebic dysentery "carriers" should be discharged.

Recommendation Regarding Prophylaxis.—Anyone who witnessed the ravages of endamebic dysentery among our troops in the Philippine Islands, especially between 1899 and 1903, will have a very vivid conception of the importance of this disease from a military standpoint. During the period mentioned, the disease caused more deaths and an infinitely greater amount of invalidism among our troops in the islands than either typhoid fever, bacillary dysentery, or cholera, and even the small epidemic at El Paso has furnished, during the time it lasted, more patients to the hospital than any other infection of like gravity, and had conditions remained favorable there is no doubt many hundred more cases would have occurred. It is evident, therefore, that the prophylaxis of endamebic dysentery is a most important military subject and should receive more attention than it has in the past.

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Certain facts in the epidemiology of this form of dysentery are now well established, the most important of which are the following:

1. Endamebic dysentery is caused by a distinct species of endamebae, *Endameba histolytica*. This species is an obligatory parasite and cannot multiply outside the body of its host, which, so far as is definitely known, is man.

2. The disease can only reach the intestine of man by the ingestion of material containing *Endameba histolytica* through the mouth, generally in the encysted stage of development.

3. Every case of endamebic dysentery is, therefore, dependent for its origin upon another and previous infection.

4. The disease may not only originate from individuals who have acute symptoms of the infection, but from those who have recovered and are "convalescent carriers," and those who have never had the disease but show cysts of *Endameba histolytica* in their stools, and are "contact carriers" of the infection.

5. The greatest source of infection are such "carriers" of the disease.

6. The patient in the acute stage of the disease is not as dangerous, so far as its transmission is concerned, as the convalescent, or even apparently healthy individuals, who are "carriers," because cysts are not usually present in the stools during acute symptoms.

These facts demonstrate that the prophylaxis of this infection depends upon the discovery, isolation, and treatment of "carriers" and the proper disposal of the excreta of "carriers" and of those suffering from the disease. Based upon these facts and the epidemiological data secured during this epidemic, the following measures are recommended for the prevention of endamebic dysentery in the military service:

1. When a case of this disease is discovered in an organization a microscopic examination of the stools of all soldiers, whose duties have to do with the preparation or serving of food or drink, should be made for cysts of *Endameba histolytica*, and, if possible, the examination should include all members of the organization.

2. If "carriers" of the infection are discovered they should be admitted to hospital at once and treated, the treatment being controlled by weekly examination of the stools, extending over a period of at least two months after the completion of treatment, as it is useless to base a diagnosis of the cure of the infection upon the absence of endamebae from the stools a week or two after cessation of treatment, for, in most instances, the endamebae disappear shortly after treatment is begun, but only to reappear later.

3. If "carriers" prove resistant to treatment they should be discharged from the service. Experience has shown that, unless this is done, it will be necessary to carry them in hospital indefinitely, if danger of their spreading the infection is to be avoided.

4. The excreta of all individuals showing any form of *Endameba histolytica* should be disinfected immediately after passage, whenever practicable. This rule should never be broken where it is necessary to dispose of the excreta in latrines or by any method where it is possible for flies to gain access to the excreta.

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5. The screening of cook houses, mess tents or halls, and of food from flies is a measure of paramount importance, as these insects are undoubtedly the greatest factor in the spread of endamebic dysentery under conditions present in temporary or semi-permanent camps.

6. The prevention of the breeding of flies, and their destruction if breeding cannot be prevented, is a prophylactic measure of great importance. To this end picket lines should be as far removed as practicable from quarters and mess tents and no manure be allowed to collect; all collections of organic material suitable for the breeding of flies should be sought for and destroyed; latrines should be built as nearly fly-proof as possible and, if not fly-proof, should be treated with a mixture of lamp-black and kerosene; fly traps should be extensively used and frequently emptied; and camps should be located as far away as possible from native habitations in regions where endamebic dysentery is endemic.

7. The water supply should be carefully guarded from infection and if there is any question of its purity, it should be boiled or the Lyster bag be used.

8. In regions where the disease is endemic the use of uncooked fruits, vegetables, and salads should be prohibited.

9. Physicians and nurses who have the care and handling of cases of this disease should take the same precautions as regards personal prophylaxis as they would in handling cases of typhoid, paratyphoid, or similar infections.

10. Patients suffering from the disease or who become "carriers" of it, should be informed of the danger of their transmitting it to the healthy and instructed regarding the measures that they may take to prevent such transmission.

Endamebic dysentery, like most of the infectious diseases that are a menace to armies, is a strictly preventable disease and it is most fortunate that the well recognized sanitary measures now taken by military sanitarians for the prevention of diseases like bacillary dysentery, cholera, paratyphoid fever and typhoid fever, are also efficient in the prevention of this disease. The isolation of the sick; the discovery, isolation, and treatment of "carriers;" the destruction of flies; the sterilization of drinking water; the precautions to prevent contamination of food; and the proper treatment and disposal of feces, are the measures upon which we must depend for the prevention of epidemics of endamebic dysentery and they are also the measures upon which the prophylaxis of most camp infections are based. Our present knowledge is sufficient to demonstrate that, in its epidemiological features, endamebic dysentery is strictly comparable with the diseases mentioned, and, therefore, the same general methods of prophylaxis are indicated, and, if properly applied, will meet with the same measure of success. There is, in my opinion, nothing mysterious about the origin and transmission of this disease, and if we are to meet with success in its prevention, we must constantly bear in mind the important rôle played by "carriers" and flies in its transmission.

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EDITORIAL

STAFF COÖPERATION IN RESPECT TO SANITARY UTILITIES

One thing which has impressed those having to do with the sanitation of troops along the border has been the existence of a certain lack of coördination of effort between the supply and sanitary services. This is in no sense intentional, and one hastens to bear witness to the earnest coöperation of the Quartermaster's Department in the remedying of sanitary defects which are brought to its attention. But some of these defects should never have existed, and their correction after being allowed to arise implies delay and the expenditure of money and effort which might otherwise have been conserved. The reason for this situation is the absence of any definite standard plans and specifications, officially adopted by the War Department, for such public utilities for troops in camp as have an effect upon health conditions. And most such utilities, such as relate to shelter, messing, water supply, and disposal of excreta, garbage and wastes, do influence health conditions. These variations of utilities imply diversity in sanitary efficiency and corresponding modification of the sanitary methods to be employed in their utilization.

The usual method for the provision of camp sanitary conveniences seems now to be about as follows: A Department Quartermaster is ordered to arrange for the encampment of a large body of troops. He designates a subordinate to carry out this work. The latter may or may not have had previous experience as a camp quartermaster and, if detailed from the coast artillery, will likely have had little practical experience with mobile troops in the field. He is given whatever advice and assistance the quartermasters at headquarters can supply, and the rest of the problem, with most of its details, he finds that he has to work out for himself. Much of the information upon which to base his work is necessarily technical, and along lines of study and thought which he has never had the time or incentive to pursue. He calls in the aid of civilian clerks and draftsmen, probably quite as unfamiliar with camp conditions as himself, and with this relatively unqualified assistance he undertakes his task. Many of the conditions which he is expected to meet, and which are to him unsolved problems, have already been solved by others, at former times and in diverse places, and they have long since filed reports, recommendations and specifications thereon. But he does not know this, for their reports and recommendations have been buried in the archives of the War Department, and no practical official use made of the information they contain. So far as being of

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use to the local quartermaster, they might as well not have been written. He does not even know of their existence. All he can do is to attack, to the best of his ability, a problem which is novel to him but very likely a settled question to others as a result of their past experience.

The results are often unsatisfactory, for willingness cannot offset inexperience and lack of technical knowledge and training. It is rare that such an individual can at once, by himself, achieve the perfection of results and measures which would be yielded by the combination and digestion of the experiences of many others extended over long periods.

It follows that the types of latrines, incinerators, bath houses, mess shacks and other facilities in one camp are usually different in various respects from those in others; and where one of these diverse types is entirely acceptable from a sanitary standpoint, the other types are necessarily defective, often in considerable degree. To criticize and insist on remedy of the faults may not be conducive to best relations with the persons responsible—to accept them is to add to an already weighty sanitary burden.

The camp sanitary officer, on his part, as a rule is assigned to duty as such on or after the arrival of troops. By that time the quartermaster's work has very largely been done, and along lines which may or may not be found satisfactory from a sanitary standpoint. Rarely has a medical officer been consulted in this respect, and the utilities which have been created are often defective through imperfect knowledge of the accepted purposes and measures of sanitary use. It is then too late to build correctly from the beginning, for the money has been spent and structures completed. Effort can only be directed toward modification, which is too often incomplete and unsatisfactory. The sanitary officers have therefore had to contend with latrine boxes leaking flies about bottoms, through cracks and warps and seat-holes; with cross-bracing that prevented burning-out; with boxes too large to readily handle, and with shelters too small to let enough men get around the box to handle it, resulting in rotation which breaks down the pit-wall. There were incinerators of diverse kinds, varying efficiency and flimsy construction. There were ice-boxes of every conceivable variety and degree of unsuitability. There were no specified places for the location of kitchen and mess facilities in the mess shacks. There were supposedly fly-proof mess shacks, lacking part of screening, warped to admit flies in swarms, and with screen doors swinging in rather than out. There were tight caps to tents which absolutely destroyed ventilation. And numerous other defects, with sanitary difficulties resulting therefrom, might be mentioned.

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All this is of course unnecessary. As has been said, it is not the fault of any individual or branch of the service, but of lack of coördination between the supply and sanitary departments. For this, the system which controls the military service and the War Department itself are to be blamed.

Having made the diagnosis as above, the remedy is simple. A board with representatives from the Medical Department, Engineer Corps, Quartermaster's Department and the line, should be convened. This board should work out the most satisfactory type of camp utilities, with descriptions, specifications and plans and directions for use. Most of this can be done by digestion of reports by competent observers, now on file at the War Department, The report of this board fully illustrated, after approval, should be published as an order, circular or other official document, and its requirements should not be deviated from by quartermasters and others. Its information, concise yet complete, would always be available, and thereafter substitute the best thought of the service as a whole for the incomplete knowledge and often immature experience of the individual. If some simple plan of this nature were carried out, many of the perplexities which have lately beset the sanitary officers would be removed.

E. L. M.

RECRUITING FOR THE MEDICAL CORPS

In view of the unusual number of vacancies in the Medical Corps of the Army and Navy, at the present crisis, it is imperative to adopt a more vigorous campaign for securing applicants. The usual aid to recruiting, editorials and notices in medical journals, the distributing of circulars setting forth the advantages offered to young physicians, as to rank, pay and opportunities for "seeing the world," and devoting themselves to special work—all these have been tried for years and have served their purpose, in their day and generation.

A circular has recently been sent to all members of the Medical Reserve Corps, U. S. Army (Inactive), urging them to use their personal influence with desirable young fellows under their supervision in medical schools and hospitals. This is a step in the right direction, for which we have long contended. It is the duty, as well as the privilege, of the older men to assist the medical departments of the Army and Navy to obtain the best material that is available. We are inclined to place the inducements before prospective candidates on too low a plane—the usual appeal being to self-interest rather than to patriotism. Every attending surgeon of a hospital is at some time consulted by his internes as to their future plans and is happy to advise them for their

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best interests. Why not hold up a career in the Medical Corps of the Army and Navy as one of the highest and most honorable of all?

The writer has during his twenty-five years of active hospital work made it a point to approach his retiring house-surgeons with the serious question: "Why do you not go up for examination for the service?" Surely one who has watched young men for four years in the medical college, and two more in the hospital, is able to select those whom he knows are well fitted mentally, morally and physically for the honorable title, "officer and gentleman."

This obvious duty has been sadly neglected by men in responsible positions, otherwise both corps would long ago have been recruited up to full strength.

Personally one of the greatest rewards of the writer has been the satisfaction of watching the careers of young officers whom he has induced to enter the Army and Navy and who have "made good." Is not this a serious question for those of us who are too old for active service, but wish to provide worthy "substitutes?"

H. C. Coe.

OUR RESOURCES IN MEDICAL PERSONNEL

Dr. A. L. Benedict, the editor of the *Buffalo Medical Journal*, has recently published an "Estimate of the medical profession from the standpoint of military preparedness" which is informing and timely, as well as of importance from the viewpoint of civil requirement. Even though it might appear therefrom that the profession is now somewhat overcrowded, it is reasonable to assume that there are not many more physicians than are needed to meet the actual requirements of the civil population, considering the area over which it is spread. This assumption is based upon the common-sense rule that supply and demand are usually fairly well balanced.

Dr. Benedict estimates that, of the 132,770 physicians listed in Polk's Directory, about 87 per cent are in the actual practice of their profession; in a word we have 115,500 physicians to care for the population and provide medical officers for our Army and Navy.

Without going too closely into details, we may safely estimate that any temporary army we require will number not less than a million, for which the civil practitioner must furnish the medical officers. Based upon the allowance to the permanent army, 7/10 of one per cent of total strength, which is a modest estimate of requirement in active service, the temporary army must have 7,000 medical officers, or 6 per cent of the available civil personnel. In addition, it is estimated that the services of 3/10 of 1 per cent would be required to meet the emer-

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gencies of great battles and care for the more or less chronic military invalids behind the zones of operations. This personnel, it is expected, would be supplied through the Red Cross and would not as a rule be wholly separated from its civil work.

From the foregoing it will be seen that, independent of what the permanent army may require, and it (though presumably fully officered at the start, a somewhat violent presumption) will ultimately have to make considerable demands, the civil profession must be prepared to supply 7,000 physicians at once, to be entirely detached from their home practice, and 3,000 for emergencies—per million of troops. But the wastage of medical officers is quite as great as of other officers, for they are subjected to the same vicissitudes of battle and, besides, must brave the dangers of pestilence as well. This wastage, estimated at 10 per cent, will begin with the first day of mobilization and must be promptly replaced from an immediately available reserve. This will demand from the source of supply at least 700 per annum, probably more, for sanitary troops in the theater of war, not counting the wastage in the reserves. So much for the temporary army.

For the permanent army, 200,000 strength, 1,400 medical officers are allowed and 500 now provided, who are probably included in Dr. Benedict's total number of physicians. Certainly 1,000 are, and in any event their wastage must be supplied from the only available source, the civil profession—140 per annum.

To sum up—for each million of men mobilized we must have 7,000 medical officers for full duty and 3,000 for partial duty, together with 700 to supply the annual wastage of war; and, for every fraction of a million, a proportionate number. In a word, for the twelve hundred thousand which may safely be estimated as the beginnings of any effective force we might require, we must have 12,000 immediately available physicians, of whom 8,400 should be under 50 years of age and 3,600 not more than 60 years.

Again referring to Dr. Benedict's paper we find that there are 79,800 physicians under 50 years and 23,710 between fifty and sixty, or a total of 103,510, from whom to draw our 12,000 medical officers and maintain this number.

The current wastage in the profession is probably at this time more than offset by the annual accession from the medical schools. Nor is this likely to decrease, even though this accession has markedly fallen off since 1904. The increasing public demand will always be met, no matter the cost. So with our rapidly growing population, the output of the schools must be increased, or we must recognize a lower class of practitioners, such as exist in Europe today.

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The important question is can we spare for the army 10 per cent of the available physicians of the country? If yes, can we spare 20 per cent? If yes, what is the maximum number that can be spared without undue neglect of the civil population?

Dr. Benedict writes that "the corresponding demand for 7,000 medical officers would not in the slightest degree tax the resources of the medical profession. On the contrary, it would be a wholesome, though entirely inadequate factor in relieving the economic evils of excess of supply over demand."

THE MILITARY SURGEON,[1] quoting from a recent interview with Dr. Osler, said, "Already the Royal Army Medical Corps has taken 11,000 doctors from private practice and they are asking for another 4,000, making in all 15,000. This, with 1,500 medical officers in the permanent service, gives a total of 16,500 to attend to an army of about 4,000,000." It is needless to say that if the British Army has this strength, and only this number of medical officers, it is hopelessly undermanned in its sanitary department. It would require twice this number at least. So we may assume the strength given was probably a *ruse de guerre*. But the point lies in the further remarks of Sir William. "The position at home is serious, as there are only 30,000 medical men and women in practice. With 15,000 taken away no more than 15,000 are left to attend to a population of forty-one million men, women and children. How grave the position is may be suggested by recalling that more than 500,000 industrial casualties occur in this country every year, which is hugely heavier (sic) than the casualties at the British front in a year of the present war."

From the foregoing, it would appear that we have approximately one physician to 750 of population while the United Kingdom has one to 1,366. But we have a huge country to cover and they "a tight little island." Space is a factor in the practice of medicine.

We are fortunate in the number of our physicians and are not likely to be forced to call for outside help in this direction in the event of war. Nevertheless, in that contingency we will need all we have to meet the demands of both the civil and military communities.

ECONOMICS OF GOOD SANITARY ORGANIZATION

Dr. Carrel's address before the Army Medical School, published in this number, is convincing evidence of the pecuniary advantages to the country of a properly organized and thoroughly equipped Medical Department, ready from the beginning to meet the epidemic of wounds and injuries which is the inevitable accompaniment of war.

[1]Vol. xxxix, p. 232.

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FIG. 1.—TAKEN AUGUST 20, 1916.

FIG. 2.—TAKEN DECEMBER 15, 1916.

(To face page 441.)

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The saving of life and limb, time and money resulting from such is incalculable. Dr. Carrel said:

"Of 136 wounds treated in my hospital in December, 1915, 121 were closed before the twelfth day. As the normal cicatrization of most of these wounds would have taken, by ordinary methods, from 30 to 60 or even 100 days, it is easy to understand the saving of money which was effected. If we assume that every wounded man cost $2 per day, it will cost the country $180, if he stays ninety days in the hospital. If the wound is healed in twenty days it represents a saving to the country of $140, and for a thousand wounds the saving is $140,000."

This leaves wholly out of consideration the early return of the soldier to the front. Or, in event of his discharge, a lesser degree of disability and consequent smaller pension charge and his greater productive value, not to mention the enormous reduction in suffering to the individual.

THE MILITARY SURGEON wishes these facts might be so impressed upon our people that Congress would be constrained to see that the Sanitary Department is provided with the necessary authority, money, personnel and material now, so that its duties may be performed efficiently and economically from the very inception of any hostilities and not wait until incalculable damage has been done to our men, war prolonged and prospective millions spent in pensions. Wait indeed until, all too late, the people arise in their wrath and demand that such shall no longer be permitted.

Regarded from a wholly material point of view, such an investment would yield large interest.

SOLDIERS TWO

In this era of illustration and get wise quick or leave it, perhaps the photographic story of Tobe and Billy herewith, will sink deeper than a long dissertation on the advantages of military training.

Private Tobe White, Co. K, first North Carolina Infantry (on the left) and Priv. W. C. Bryson, of the same company, enlisted in their native State, August 15, 1916, for service on the border; and their photographs as shown on the opposite page were taken August 20. These men proceeded with their regiment to Texas and there were photographed December 15, four months after enlistment. This picture is placed beside the first.

Lieutenant Colonel Allison, 2d S. C. Infantry, who sent the photos, writes: "To my mind there is no stronger evidence of what military service will do. . . . I am prepared to say this is no exceptional case of improvement in physical appearance noted by me generally throughout the National Guard troops serving here (El Paso). This is simply a photographically recorded fact, without intention of making a record, and one deserving careful consideration by all who are inclined to condemn universal military training, before they express themselves against such. . . . I may be too strong in my statement, but I believe universal military training will raise the standard of citizenship of this country from 50 to 75 per cent in ten years." Comment is unnecessary.

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COMMENT AND CRITICISM

Regarding the essays entered for the second prize in the Wellcome contest, published in this journal, it is rather curious, as well as, perhaps, somewhat interesting to note that, though written from a different viewpoint and treated in a diverse manner, quite independent of one another the two authors arrived at pretty much the same conclusion in the end.

In the winning essay submitted by Asst. Surg. Gen. W. C. Rucker, U. S. P. H. S., under the *nom de plume* "Isis," which appeared in the March issue of THE MILITARY SURGEON, the subject was treated in a broad and comprehensive manner. The conclusion was reached that the European war would not be detrimental in its effect upon health conditions in Europe, but on the contrary, for reasons which were stated, there would be an actual improvement in the public health in European countries, and therefore the United States had nothing to fear from that source.

The essay given honorable mention in the competition, and its author awarded a life membership in the Association, written by Passed Asst. Surg. J. R. Hurley, U. S. P. H. S., under the *nom de plume* "Sanitario," follows. In it the various communicable diseases, exotic and otherwise, which might be brought into the war zone and spread among the troops, and from them to the civil population, are taken up in detail and the probabilities of the spread of each analyzed. In this treatment of the subject the author, while not going so far as to say that the public health in Europe would be improved as the result of the war, comes to the conclusion that, saving venereal diseases and certain diseases such as cholera and typhus which might possibly become epidemic in the western trenches, as they have been at various places in the eastern theater of the war, disease conditions in Europe would probably be no worse after the war than before. Furthermore, that we in the United States should not take a pessimistic view of the outcome; but rather should we face the future with calm minds, not fatuously, but with confidence that should, perchance, the warring nations become afflicted with an increased amount of disease, the barriers already erected, in the shape of the Quarantine and Immigration Services of the United States, against the diseased hordes of Europe would be sufficient, or could easily be made sufficient, to obviate the danger of an adverse effect upon disease conditions in the United States.

These two articles are hardly contradictory at any point; rather are they supplemental to one another. Taken together they constitute what may be considered as an exhaustive treatise from every angle of the

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subject. It remains to be seen whether our readers concur in the statements made and the conclusions reached. There is food for thought in the subject, at least.—ACTING EDITOR.

THE INFLUENCE OF THE EUROPEAN WAR UPON THE SPREAD OF THE INFECTIONS OF DISEASE WITH ESPECIAL REFERENCE TO ITS EFFECT UPON DISEASE CONDITIONS IN THE UNITED STATES

Since the earliest times the gathering together of large bodies of soldiery from various parts of the world in war has been responsible for the spread of disease, and it may be that the diseases thus carried become implanted permanently. More especially is this likely to be the case where latitude and climate resemble those met with in the original home of the disease.

The reasons for these extensions we are now in a position to understand in many instances, though some still remain obscure; the climate together with the absence or presence of the insect *carrier* of the disease being determining factors.

Some tell us that it was in all probability owing to contact in war that ancient Greece and Rome became infected with malaria, and that it was the importation of this disease that caused the subsidence of the vigor of these peoples and contributed materially to the disappearance of the dominance of Greece and to the decline and fall of Rome.

At the present time we have an assemblage of soldiers from many lands in Europe, particularly noticeable in the western battle lines. The intimate contact inseparable from camp and trench life would favor the transmission and spread of any and all diseases of a communicable nature known to man, save only those requiring an insect host or vector not indigenous to the regions in which the operations of the war are being carried on.

It will be necessary to discuss the probable influence of the war upon disease conditions in Europe preliminary to the discussion of the resulting effects of these conditions upon the United States.

That the germs of exotic diseases will be brought into the war zone and, if conditions are favorable, spread to the soldiers of the European nations on both sides is a reasonable supposition. We know that military units from the various colonies belonging to the Allies, tropical and otherwise, have been concentrated in Europe.

Soldiers from Algeria, Arabia and the Sudan may occupy the trenches alternately or in company with the fighting men of France. Likewise men from the various parts of India, the West Indies, Fiji and Hong Kong will meet and fight side by side, mayhap, with the battalions from Australia, Canada and the British Isles.

It is therefore conceivable that many diseases endemic in the tropical

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homes of these various troops may be introduced into Europe and disseminated among the representatives of the several armies, and by them carried to the homeland when returning wounded or with organizations during or after the war.

The Central Powers are not free from this threatened menace, as the germs of disease brought within their lines in the persons of wounded and other prisoners falling into their hands, constitute a similar menace, though less threatening and easier to be dealt with in their case than in the case of the other European nations.

This is but one aspect of the question as it affects Europe. Troops from Great Britain have been sent to foreign lands, to East Africa, to Arabia, the Dardanelles, Egypt and Mesopotamia, and Russian soldiery have appeared in Persia and Turkey. Here they will encounter the various diseases of warm countries, of which the above are well known hot beds, and it is not unreasonable to assume that numbers of them will fall victims to endemic disease. Similarly, forces from the Central Powers have gone into the Balkan regions and Asia Minor where they would meet diseases long ago banished from northern Europe or hitherto not introduced.

It is believed that herein lies a greater danger than the one in which it is presumed that exotic diseases will be brought into Europe with foreign levies. It is but reasonable to assume that in the enlistment of soldiers in colonial organizations it is prerequisite that the applicant shall be of sound physique and free from any disease discoverable by ordinary means. It is a tenable hypothesis, however, that the soldier subsequent to enlistment might contract an infection and at the time of starting for the front be either in the incubation period, or in so early a stage as to escape attention, and upon developing the disease after reaching the European battle lines convey the infection to others.

In the case of the armies serving abroad in tropical climes, unless unusually severe quarantine restrictions are adopted prior to embarkation for the homeland, coupled with a physical examination of the whole personnel aided by laboratory procedures, the danger of bringing home with them the germs of unwelcome diseases is undoubtedly a real one.

There is no reason for believing that these prospective dangers are not known and appreciated by the medical officers of the European armies. Being known, whether they will have the power and means to carry out effective measures to prevent the introduction and spread of these diseases throughout Europe, and other homelands, is reasonably open to doubt. That they will do all that lies within their power we may rest assured.

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It would seem well to consider as briefly as possible what diseases might be brought to Europe with troops from abroad, especially those from the tropics; what would be the chances of these diseases spreading, and furthermore establishing themselves in their new environment.

MALARIA

The spread of this disease depends upon two factors: First, the presence of "carriers" or men who harbor the parasites in their blood; and second, the presence of certain varieties of Anopheline mosquito to become infected by these carriers and convey the infection to other men.

It is quite likely that numerous carriers of this disease will exist among the troops, imported and returning from tropical countries. It might be expected that there would be an increased incidence of malaria among the regiments associated with these foreign organizations during the summer months, as according to Manson (1) at least three species of Anopheles mosquitoes which have been found to foster malaria parasites are known to exist in Europe.

That malaria will spread among the troops to any great degree, or among the civil population during or after the war, is not believed to be a likely probability for the following reasons:

First.—Had conditions been entirely favorable, ample opportunities have previously occurred for it to spread throughout Europe and become endemic, the result of explorers, navigators and soldiers returning from the Americas and tropical parts of the Eastern Hemisphere with the organisms in their blood. Apparently, moreover, those regions capable of continued infection are already infected. Castellani and Chalmers (2*a*) state that malaria is known to exist in the south and west of France and in Germany along the course of the Rhine and in the lowlands bordering the Danube.

Second.—As Mitzmain (3) (1915) has demonstrated, Anopheline mosquitoes are not the means whereby malarial infection is carried over the winter from one season to the next. While some mosquitoes do hibernate over the winter, in these, even if infected, the malarial organisms die due to the low temperature. Man is the carrier and infects new crops of mosquitoes each year, often when showing no symptoms of the disease himself. Thus is it explained why a continuously warm, moist climate is requisite for malaria to become an endemic scourge, and why those regions in Europe, and elsewhere, in which there is a cold winter, malaria does not reach and maintain serious proportions—the mosquito link in the chain being broken for about six months in the year.

Third.—The belief in the above is strengthened by facts mentioned in an article by Rankin (4), (1916) in which he alludes to these peculiarities in reporting the incidence of tertian malaria among British troops in Flanders. He states that from April to July, 1915, while conducting blood examinations of troops

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who had been in service in a malarial country (exact locality not named), numerous persons were found harboring *Plasmodium vivax* in their blood. He anticipated that conditions being favorable the disease might spread among the new recruits and so instituted a search for infectible mosquitoes. He was rewarded by finding two varieties: *A. bifurcatis* and *A. maculipennis*. The latter was said to be prevalent in large numbers. While the conditions as regards temperature were hardly thought to be favorable, during August he saw 14 cases of tertian malaria among troops from Liverpool and Scotland who had never before been exposed to the infection. He concludes that: "*A. maculipennis*, of Flanders, is evidently not too resistant nor yet too susceptible to convey a strain or strains of *P. vivax*, tropical or subtropical in origin, under the circumstances that obtained."

TRYPANASOMIASIS

This may be dismissed with but few words. While it is not improbable that trypanasomes may be brought to Europe and the British Isles in the blood of returning soldiers from East Africa, there is no danger, so far as known, from the spread of the disease. This, because tsetse flies, the vectors and hosts of these organisms, do not abound, so far as known, outside of certain localities in Africa. The absence of certain wild game abundant in Africa, said to be the reservoir of infection, also militates against this spread.

LEISHMANIASIS

Both kala-azar and oriental sore will be included under this heading, as Manson (1*a*) says: "These diseases, though clinically quite distinct and having a definite topical and geographical distribution, are associated with what appears to be the same organism, Leishmania." From the same author we learn that kala-azar is widely distributed and found among other places, in eastern India, Arabia, the Soudan, Tunis, Sicily, Italy, Algeria, Crete, Spain, Portugal, Greece, the Caucasus and South Africa; and that oriental sore, sometimes called Delhi boil, is endemic in Morocco, parts of the Sahara, the Niger, Egypt, Crete, Cyprus, Asia Minor, Syria, Mesopotamia, Arabia, Persia, the Caucasus, Turkestan and parts of India. Where an infection is so widespread as this it is hardly to be expected that the infecting organism could escape being brought into northern Europe, when it is considered that native troops have been transported from several sections where this disease is known to be endemic, and that troops, principally British, or from British Colonies, have penetrated regions where it abounds during the period of the present conflict. Especially is this likely to be the case with the oriental sore. While kala-azar is more acute, and the incubation period about ten days, in the case of oriental sore the incubation

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period, according to Manson (1*b*), may be as long as fifteen months. Hence numerous victims among the troops could be in the incubation stage and not show signs of the disease for perhaps days, weeks or even months after their return home. In the absence of definite knowledge as to its means of transmission, it cannot be definitely stated whether Leishmaniasis may establish itself in Europe after the war. The supposition is, however, that it would not. While flies, fleas, mosquitoes and bed bugs have been indicted as the transmitting agents it probably requires other conditions regarding heat and moisture to remain alive outside the warm-blooded host. Dogs are said to be infected with this organism in certain localities in the East. The writer would infer that, generally speaking, dogs are neither so numerous nor in such intimate contact with man in Europe as in certain parts of the Orient where the disease prevails.

While oriental sore may be spread by direct contact among the troops, or even to the civil population, it is believed that this could be controlled in a country where not endemic by simple isolation of the patients until recovery.

Kala-azar has already been found among troops returning to England from abroad, two cases being reported by Ward (5) during 1915 in soldiers who had recently been in Malta. He makes no reference to its probable spread, but draws attention to the facts in the following words: "(1) That cases of kala-azar are to be expected among men returning from Malta and who have never been any further east than that point. (2) That the diagnosis is likely to be very difficult to those unacquainted with tropical diseases."

RELAPSING FEVER

Hagler (6) naively remarks that: "While much publicity has been given typhus fever, relapsing fever has failed to excite a corresponding degree of interest." Further that: "It seems probable, in the event of a conclusion of peace not too far distant, that the increased returning tide of immigration to our shores will bring with it the old and ever present menace of strange disease." This writer from his experience in the American Red Cross Hospital at Belgrade is authority as to the prevalence of relapsing fever in Serbia. In addition Manson (1*c*) is authority for the statement that it is found in Britain and Ireland; also in Norway, Denmark, Germany, Russia and Turkey. That in Africa it prevails in Egypt, the Soudan, Algeria and the Congo Free State; also in Asia, China, India and Sumatra. Furthermore, that it was recognized in the United States in 1844, and was epidemic in New York and Philadelphia in 1869, and is likewise probably widely distributed throughout

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South and Central America. Regarding the transmission of this disease it is pretty generally stated that the specific organism, *Spirocheta recurrentis*, is conveyed from one person to another by infected lice, ticks or bed bugs. Hagler, in the same article quoted from above, says: "Relapsing fever appeared with typhus (which is admittedly transmitted by the louse) and measures instituted against lice soon markedly decreased the incidence of both. This difference is noted, however, that whereas typhus practically disappeared with the lice, relapsing fever persisted and continued to develop in the medical wards of our Belgrade hospital until systematic sulphur fumigation of wards and rooms was undertaken to destroy bed bugs. After this it also disappeared. Thus it would seem that the bed bug certainly is one and probably the most important of the agencies of transmission." In view of the wide spread distribution of relapsing fever as quoted from Manson, it would seem difficult to introduce this disease to any locality where it at some time has not been previously found. It would seem apparent that its incidence has subsided concomitantly with increasing civilization and its accompanying improved sanitation and personal cleanliness, these two factors going hand in hand to decrease the prevalence of lice and bed bugs. When some calamity such as war overtakes the inhabitants of any section, reducing them to primitive sanitary conditions, the disease, apparently slumbering there, breaks out afresh and soon assumes epidemic proportions coincident with the great increase of body vermin fostered by these conditions. The means of controlling this disease are known, and should epidemics occur in Europe during or after the war, as sanitary conditions are readjusted and the authorities concentrate on eradicative measures, it is reasonable to assume that this disease will be again reduced to its incidence previous to the war.

YELLOW FEVER

This disease, formerly such a scourge to the West Indies and the Americas, has fortunately never assumed serious epidemic proportions in Europe. Manson (1*d*) is the authority for this statement, as he says: "Yellow fever has been imported frequently into Portugal and Spain, and once from Spain into Italy. Although a good many died in these visitations, the disease has never obtained a permanent footing in Europe. Cases have occurred in seaport towns in France and Great Britain—Brent and Swansea, for example; invariably, however, these little epidemics have died out."

According to Public Health Reports (7), containing the latest authentic information available at the time of writing, yellow fever is known to be prevalent only in certain localities in Ecuador and Mexico.

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The single locality in the Old World where this disease is known to prevail is that part of Western Africa known as the "Gold Coast." No reports have come to the attention of the writer that yellow fever has appeared among the European armies so far during this war, and, so far as known, no organizations have come from or been sent to localities where it is known to exist. Why yellow fever failed to establish itself when brought to Europe previously is evidently because a continuously warm, moist climate, together with the presence of its specific host, *Aedes calopus*, was lacking. It is believed that the chances of this disease being brought to Europe and spreading the result of conditions brought about by the present war are, to say the least, remote.

DENGUE FEVER

This is an acute disease of very low mortality, and for these and other reasons worthy of but small consideration in this paper.

Though European troops are serving in localities where it is known to exist, the fact that it requires high atmospheric temperatures coupled with apparently the presence of a certain variety of Culex mosquito (*Culex fatigans*) would seem to preclude its spread in Europe even if introduced.

Varieties of Culex mosquitoes are found distributed very widely over the world, but the one variety requisite, together with the other factor mentioned, is not understood to be regularly present throughout the greater part of Europe.

BUBONIC PLAGUE

Though troops have been sent to and received from localities where plague is endemic (Mesopotamia, India, etc.), the danger of this disease being introduced into Europe through the medium of the soldiers, *per se*, is of minor importance.

The real danger lies in the introduction of plague infected rats from endemic centers hidden in the baggage and impedimenta of these troops. That a few such rodents might be so introduced is quite possible; that many would be likely to find such harborage under the circumstances seems unlikely. The introduction of any live rodents and their fleas in this manner is easily prevented with the adoption of proper precautions regarding fumigation and search of both baggage and transport ships on arrival at European ports. It is not too much to assume that the sanitary officers of the regiments in question would be alive to this danger and take steps to prevent it. It would be highly incumbent upon them to do so, as the adoption of measures to prevent the introduction of this disease are both simple and inexpensive when

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compared with the efforts necessary to eradicate plague once it has secured a foothold in any given community.

The neglect of these precautions, with a result of possible infection of ports in Europe with plague, would be a real calamity. However, even should this occur, it would not be the first time in history that plague has appeared in Europe.

Of the epidemic in London starting in 1664 we have a graphic account in De Foe's Journal of the Plague Year in London.

Continental Europe has been ravaged by this disease on more than one occasion, dating from its first appearance in 542 A. D. during Justinian's time, with repeated widespread epidemics since that date, though none of any magnitude within the last century. Plague infected rats have been found in the port of London as well as in other ports of England on several occasions within the last decade. Considering that the mode of spread of plague as well as the measures necessary for its eradication are so well known, taken in conjunction with the type of construction (brick and stone) in vogue in European ports, enable us to discount the probabilities of its spread, even though its introduction should occur.

UNDULANT FEVER

Otherwise known as Malta or Mediterranean fever. It is quite conceivable that the *Micrococcus melitensis* may be brought to the European battlefields, as this disease is found not only in Malta, but according to Castellani and Chalmers(*2b*) it is quite prevalent throughout the Mediterranean coast, the Punjaub in India, East and South Africa and the West Indies. It is very doubtful, however, that there would be any considerable spread of the disease from infected soldiers, as the authorities just mentioned state: "It is certainly a disease of tropical and subtropical climates." Furthermore, its spread by contact seems to be questionable. Various animals harbor the organisms of the disease, more especially goats, and it is by drinking the milk of these animals that the great majority of the cases seem to occur. Unless infected goats happen to be widely introduced throughout Europe for some reason connected with the war, the spread of undulant fever is not considered to be a probability, even though numerous cases were encountered among the military forces during or after the war.

CHOLERA

Here we have to consider a disease which, though it has been principally relegated to the tropics, where poor sanitation is most likely to exist, it is not essentially a tropical disease. While the characteristics of the cholera vibrio of Koch are well known to sanitarians, as well as its

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mode of spread by means of human carriers, flies and infected food and water, all points as regards its appearance, decline and reappearance in epidemic form have not yet been cleared up. Armies have been frequent victims of this scourge and Europe has been overrun with the disease on more than one occasion.

According to the latest authenic reports (7*a*) available at time of writing, cholera has existed at some time during 1915 and 1916 at the following named places: In Europe, Austria-Hungary, from October 25, 1915, to February 5, 1916, 550 cases and 212 deaths; Austria, from November 7, 1915, to March 25, 1916, 362 cases and 126 deaths. In a prison camp in Hungary, from November 18 to December 10, 1915, there occurred 675 cases with 276 deaths. Numerous cases were also reported occurring in Bosnia-Herzegovina and Croatia-Slavonia from October, 1915, to the end of February, 1916. In Corfu, Greece, 30 deaths occurred during March, 1916. Numerous cases and deaths were also reported as having occurred throughout various sections of India. A number of deaths from this disease were also reported from Indo-China, Java, Persia and Russia during late 1915 and early 1916, and in Turkey in Asia during December, 1915. It will thus be see that cholera has been more or less prevalent in certain sections of Europe, as well as other parts of the world, from which military forces may be drawn or sent during at least a part of the period covered by the present European war.

Just how much cholera has occurred among the armies of the belligerents is unknown. However, from a review of current German medicine in the London *Lancet* (8) (1916) we learn that Galicia has suffered terribly from this disease, which has also made its appearance among the German troops on the Polish frontier. The sickness rate among them, however, was stated as only 0.5 per cent, and owing to the success of the inoculations among the German armies in October, 1914, only 10.2 per cent of those attacked died, whereas the mortality of those stricken among the uninoculated troops was 50 per cent.

Further light is thrown on affairs in Galicia by a recent editorial in the *Lancet* (9) (1916), in which it is stated that cholera was prevalent throughout Galicia during the summer of 1915, and it is predicted that there will likely be a recrudescence of the epidemic when the seasonal conditions again become favorable. It is stated that over 3,000 persons were attacked by cholera in that province during 1915, but the number of deaths has not been reported, the majority of sufferers being the civilian population, the military largely escaping, probably as a result of the anti-cholera inoculations. It is surmised that the infection was introduced into Galicia from Russia.

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In view of its rather widespread distribution as shown by consular reports and other sources, it seems quite probable that cholera has been prevalent to some extent among the armies of Russia and the Teutonic powers engaged in the northeastern theater of the war.

From newspaper reports we learn that during the summer of 1916 Russian troops have been brought into the western theater of the war to assist the allied forces already there. The danger of introducing cholera into France through this source is undoubtedly very real. Cholera is a disease much easier combatted among troops than in civil communities. Military food and water supplies can be more closely guarded, and thorough stool examinations, isolation and care of the sick can be more efficiently carried out among disciplined forces than otherwise. It is believed that the situation as regards cholera appears more threatening to Europe than of any disease hitherto mentioned. It already lurks in northeastern Europe, and whether it spreads farther depends partly upon circumstances and partly upon the effectiveness of the eradicative measures carried out by the sanitarians of the armies involved. At any rate the stage is set for another epidemic of cholera throughout Europe, and time alone will tell whether this is to occur.

TYPHUS FEVER

As so well stated in an editorial in the London *Journal of Tropical Medicine and Hygiene* (10) (1915): "Always the companion of war and misery, known at different times by its old names of camp fever, siege fever, famine fever and gaol fever, it raged all over Europe during the Napoleonic wars, only to die out in later years so completely as to be almost forgotten. The history of typhus is written in those dark pages of the world's history which tell of the grievous visitations of mankind by war, famine and suffering of every kind. A complete history of typhus would be the history of Europe during the last three and a half centuries. Clemow in his 'Geography of Disease' says: 'In the earliest ages of the world's history typhus accompanied famine, sieges and wars.' Yet both civilization and science had practically forgotten it. All authorities of the present generation have described it as a rare disease. Several generations of medical men grew up and died with hardly any knowledge of it. Yet six months of war with its accompanying horrors bring back mankind's old enemy, the companion of a thousand wars.

This relapse into barbarism, hopeless though it may be, is robbed of at least part of its terrors so far as typhus is concerned by the scientific advances of the last decade. We know today what in previous wars was not even suspected, that typhus is transmitted only by the louse,

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which thrives in times of squalor, congestion, confusion and despair, and that cleanly habits, frequent bathing and changing of clothing and liberal use of insecticides will prevent its development and spread. This age-long scourge has lost its terrors. Only in those countries which are so hopelessly war-ridden as to make decent living impossible is there any excuse for the presence of this disease. When the war is over it will again disappear, only to reappear again, as it always has and always will, so long as supposedly civilized nations resort to wholesale murder and destruction as a method of settling their difficulties."

A perusal of the literature shows that since the early part of 1915, when typhus assumed epidemic proportions in Serbia and Montenegro, much has been written concerning this disease. To review, even briefly, any considerable part of this literature would unduly prolong this paper. Typhus now, and until normal conditions are restored after the war, seriously threatens the whole of Europe. In spite of constant efforts to prevent it, lousiness has become prevalent among the armies on the western front. Peacock (11) (1916) in a recent article states that 95 per cent of the men among English troops examined were found to be infested with lice. So far no report has come to the attention of the writer that typhus has appeared among the armies of the Allies in France. Under the conditions, however, it needs but the spark among the tinder in the western trenches to produce a serious outbreak of the disease in question. It will require the utmost vigilance on the part of their sanitarians to prevent such an occurrence.

Should typhus appear in western Europe it is hardly believed that it will assume the magnitude of the outbreak in Serbia. In the latter country the inhabitants were so steeped in poverty, filth and despair as to be entirely incapable of helping themselves in stamping out the disease. Without the work of the International Sanitary Commission, whose herculean efforts so ably assisted by the American Red Cross contingent, and graphically described by Strong (12*a*) (1915), the director of this epoch-making sanitary campaign, the epidemic of typhus would undoubtedly be still raging in that country, and would probably have spread throughout all of eastern Europe by this time. Even so the toll of lives was terrific. The mortality as given by Strong (12*b*) (1915) was from 135,000 to 150,000 people. The total number of cases will probably never be known. However, through the efforts of Strong and his co-workers of the International Sanitary Commission, the world has been shown that, even under the most disadvantageous conditions, colossal epidemics of typhus can be stamped out now with the knowledge at our command.

As typhus is endemic in Galicia as well as in the Balkan States it will require constant watching and the prompt application of similar sup-

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pressive measures to any outbreak to prevent another epidemic. As above stated, upon the conclusion of peace and the return to sanitary and hygienic modes of life usual to our present-day civilization, we may again expect an apparent disappearance of the disease, which was at one time so widely prevalent throughout both Europe and the British Isles.

SMALLPOX

This scourge which decimated Europe following the Crusades, thanks to the discovery by Jenner in 1796 of the potency of cow pox vaccine in preventing the disease, will never again assume such alarming proportions as it reached prior to the nineteenth century. This prophylactic agent has been used again and again in stamping out epidemics within the past century, and nowhere can it be used so successfully as among disciplined military forces. There has not come to the attention of the writer any mention that smallpox has given the least concern to the troops now engaged in the European war. The only mention found regarding this disease is in an editorial in the London *Lancet* (9) (1916) in which it is stated: "Smallpox has been prevalent in Galicia almost throughout the whole of 1915, but it assumed more serious proportions at the beginning of 1916. Up to the month of February, 1916, about 32,000 persons had been attacked among a civil population with whom vaccination is generally neglected. The Austrian and German troops were not seriously affected, vaccination and revaccination being performed at the beginning of the military service of each recruit. As showing the proportions which this epidemic is now assuming, it may be mentioned that in January and February of 1916 the number of smallpox cases reported to the authorities amounted to nearly 12,000. From these facts it appears that the inhabitants of Galicia have not only lost their homes and sources of employment, but are suffering from famine, as well as being ravaged by dangerous epidemic diseases such as smallpox, which history has shown often follows like vultures in the track of armies in the field."

Galicia has been fought over and changed hands several times already during the present conflict. At the time of writing this benighted province is again in the process of recapture by the Russians from the armies of the Teutonic powers. The latter, due to their thorough system of sanitation, apparently suffered but slightly from the epidemics of cholera, smallpox and typhus that prevailed in Galicia while they held it.

If the armies of the Tsar are not equally efficient and well protected they will likely suffer severely the result of these diseases and will infect or reinfect various parts of Russia before the war is over. Furthermore, in the event of those armies being successful in their southward

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bound campaigns, they may carry these diseases with them into the plains of Hungary and even to Constantinople.

FILARIASIS

Under the caption of Filarial Disease there is comprised, according to Manson (1c), the following conditions: filarial lymphangitis, abscess, arthritis, synovitis, varicose groin, and axillary glands; lymph scrotum, cutaneous and deep lymphatic varix; orchitis, chyluria; elephantiasis of the leg, scrotum, vulva, arm, mamma and elsewhere; chylous dropsy of the tunica vaginalis; chylous ascites, chylous diarrhea, and probably other forms of the disease depending on obstruction or varicosity of the lymphatics.

These diseases are produced, according to the same author, by the presence in the blood and lymph stream of no less than five, possibly six or even more distinct species of filariae.

Filarial disease is spread by means of various species of at least three different families of mosquitoes—too numerous to even mention here—in which they undergo the extra-corporeal stage of their development. This presents a serious outlook and would be more so if it were not for the fact that there are apparently numerous varieties of mosquitoes, as well as other more common forms of blood-sucking insects, incapable of acting as the host for this parasite.

Certain species of filariae are prevalent throughout tropical Africa especially in the basin of the Congo, Fiji, several islands of the West Indies, India, the east and southern coast of Asia, and in certain places in South America and Australia. It will thus be seen that the geographical range of this nematode is quite extensive, embracing almost every country in the tropical and sub-tropical world. It is not yet clear why filarial disease has not spread yet still more widely into the cooler sections of Europe and North America.

Certainly the conditions would seem to be largely favorable as the mosquito hosts already prevail. Europeans do become infected, as Manson reports having frequently found *Filaria perstans* in the blood of Europeans who had resided on the Congo. Though, regarding this particular parasite, he states that it apparently has no great pathological significance, and that it seems to cause little harm to its host. It may be the Europeans better protect themselves against mosquitoes when in the tropics, both by day and night; and that infected men have not thus far returned to Europe in sufficient numbers to be able to infect a sufficient number of infectable mosquitoes to cause any apparent spread of the disease. Predicating upon this hypothesis, now that there are without doubt numerous microfilaria carriers in western Europe among the

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native troops from India, Fiji and elsewhere, and may be still more when the regiments sent abroad to Africa and other endemic centers return to England and the Continent after the war, the incidence may be raised to the "danger point" when it will begin to appear endogenously among the native population of Europe. This, of course, unless certain conditions of continuous warmth and moisture are prerequisite for the completion of its life cycle outside the body and further spread.

Regarding the permanent implantation of filarial disease in northern Europe it is entirely speculative. There is considerable yet to be learned concerning the epidemiology as well as other facts relating to filariasis.

DYSENTERY

Under this heading, for sake of brevity, will be considered all types of diarrheal disease, including the amebic, flagellate and bacillary forms, as all these forms are contracted and spread by means of infected drinking water and contaminated food stuffs. Flies no doubt play their part especially in spreading the bacillary forms after alighting on infectious excreta. Theoretically, by adequate care as regards the use of uncontaminated water and food (using only boiled or distilled water and freshly cooked food), avoidance of infection may be insured where any of these diseases are endemic.

According to all accounts the British troops in the Dardanelles suffered severely with dysentery and diarrheas.

In a recent report by Archibald, Hadfield, Logan and Campbell (13) (1916) published in the *Journal of the Royal Army Medical Corps*, it is stated that during the months of July, August, September and October of 1915, the most prevalent form of dysentery was amebic in type, the entameba histolytica being demonstrated in the majority. Bacillary dysentery comparatively uncommon during the summer months, began to increase in November, and in December of 1915 constituted almost the sole type of dysentery found, the Shiga group of organisms being found more commonly than the Flexner. Summarizing, they say that during five and a half months 1,921 stools were examined. Of those 518 or 27 per cent represented dysenteric stools; of the latter 70 per cent were found to be due to amebic infections, and 13 per cent to bacillary infections. In the remaining 17 per cent no apparent casual organisms could be found.

Regarding the diarrheas, they state that during the late summer and fall months diarrhea was very prevalent, but with the onset of cold weather the incidence abated in a striking manner.

They denominated certain of the cases as "sand diarrhea," noting

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that when sand storms were common the diarrhea incidence was high, due either to its direct irritating effects on the intestinal mucosa, or, more likely by the mechanical transmission of bacteria attached to the sand particles. The fly is mentioned and they state: "No stretch of the imagination was required to understand how food could be fecally fouled by the common fly; probably the two factors, flies and dust, were responsible for the greater number of the diarrheas."

Concerning diarrheas due to flagellates they say: "*Trichomonas intestinalis* was observed on fifty-seven occasions, and usually in fluid stools containing bile-stained mucus. These flagellates are apparently capable of causing diarrhea, particularly when present in large numbers. Little is known regarding their pathogenicity. Flagellates of the genera cercomonas and tetramitus were observed in only a very few cases and require no further comment."

They do not mention lamblia infections. However, in an article by Kennedy and Rosewarne (14) (1916) published in the *Lancet* it is stated: "In the course of 136 consecutive cases of dysentery invalided home from Gallipoli, we have found twelve cases in which the bacteriological findings indicate the condition was dependent upon infection by *lamblia intestinalis*. The pathogenicity of lamblia is a question still open to doubt. Within recent years several observers have recorded cases apparently of lamblia infection giving rise to a chronic dysenteric condition which resisted the usual methods of treatment. Wenyon has had under observation two or three persons who have maintained their infection for years. Some showed repeated attacks of diarrhea with passage of mucus, and one case, although passing lamblias in large numbers showed no signs of intestinal derangement. The persistence of the infection is well illustrated in our cases." With this evidence before us we may expect a large number of "carriers" of these protozoan organisms to be among the discharged soldiers after the war. Water supplies, especially in the rural districts, are quite likely to become infected by contamination with the discharges of some of these persons.

It may result in a great increase in these diarrheal diseases in countries where they were unknown before, with a still larger number of carriers added to the population. This, however, is most likely to occur in those regions where the winter is not rigorous. We know that amebae, lamblias and perhaps trichomonas undergo encystment when conditions are not favorable. As to how long they may live in such a state, and whether they may again be viable after the medium they are in is frozen is unknown. Cold weather certainly has an inhibiting effect upon the clinical manifestations of these parasites. Cases of amebic

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dysentery apparently in a serious condition are seen to recover promptly when they leave the tropics and come home to northern latitudes. Upon their return to the tropics the symptoms break out afresh. While there is a possibility of a new infection, it is more likely a recrudescence of their former one which had been latent during their northern sojourn.

Slow sand filters, as ordinarily constructed for municipal water supplies, fail to keep the effluent free from amebae where the source of supply is badly infested. These organisms insinuate themselves through the interstices between the grains of sand and so appear in the filtered water.

It is not beyond the bounds of possibility that new problems may be presented the epidemiologists and sanitary engineers in certain localities after the war, following dysenteric outbreaks resulting from water supplies infected with dangerous bacteria and protozoan organisms brought back and disseminated by the veterans of tropical battlefields.

Instances are already on record of dysentery being introduced into a country previously immune. While the conditions as regards climate and people are not very closely akin, Breinl (15) (1915) says: "Bacillary dysentery has made its appearance in New Guinea within the last decade, causing many deaths among the natives. It has been spread by dysentery carriers, natives who have apparently recovered from the disease, but harbor virulent bacteria in their intestines. Indentured laborers who have survived an attack of dysentery carry the infection to their villages, thus causing, on their return, an outbreak of the epidemic. It is certainly the most important disease in New Guinea from an economic point of view."

BILHARZIA DISEASE

This disease, also known as endemic hematuria, is caused by the presence in the veins of the bladder or rectum of a bisexual trematode belonging to the family Schistosomidae.

Bilharz, from whom the disease takes its name, in 1851 discovered the cause as this trematode and explained the peculiar circumstances surrounding the symptoms of the disease. Manson (1*f*) gives the distribution of bilharzia as follows: "In Africa, the Soudan, also in Egypt where it is believed to be present in fully one-half of the population. It occurs also in Arabia, Syria, Persia, Mesopotamia, Cyprus and Mauritius. Two cases have been reported in Western Australia in individuals who have never been out of the country; apparently the parasite was introduced by a man who had served as a soldier in the Boer War."

In those infected it appears that the female worm migrates from the

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larger veins to the smaller radicles and in these deposits her ova. The walls of the bladder and rectum are favorable situations for this purpose. The eggs, probably aided by the spine with which they are provided, are carried toward the surface of the mucous membrane, and there falling into the bladder or rectum are voided with the urine and feces, a certain amount of blood from the injured mucous membrane escaping at the same time.

Their subsequent fate and action have been the subject of considerable speculation, investigation and controversy, the latter with reference to how man became infected, and the probability of an extra-corporeal cycle.

Hitherto the scientific world has inclined towards the theories advanced by Looss, which are, in brief: that upon infected urine or feces being voided in any body of fresh water the myracidae during warm weather hatch in a few minutes, and once free from their egg shells disperse in the water to all sides. They have at once the opportunity of finding a new shelter, either in the skin of the man who voided the egg-contaminated urine or feces or in the feet, legs, arms or hands of one of his companions working or bathing close by him. If this conclusion is correct, it leads to the important consequence that the spread of *Shistosomum haematobium* is not limited by the geographical distribution of any special intermediary host. It can spread wherever man carries it, so long as the conditions as regards temperature and moisture are favorable to its development.

A more favorable aspect has been given this question lately by investigations which seem to prove that the parasite requires a definite host during its extra-corporeal existence for its proper development. Certain varieties of snails have been found to fulfil the conditions. Regarding this matter an annotation in the London *Lancet* (16) (1916) informs us as follows: "During the past three years a considerable amount of time and work has been devoted to the life history of the Schistosome worms parasitic in man. The first workers to obtain definite results were two Japanese observers, Miyairi and Suzuki, who not only succeeded in tracing the whole of the life history of the *Schistosomum japonicum* (the causative agent of Asiatic schistosomiasis) in the intermediate host—a small mollusc or snail with nine spirals very common in parts of Japan—but also in demonstrating its mode of entry into the definite host. The observations recorded by those workers were confirmed by Leiper and Atkinson in 1914. In the early part of 1915 the war office Bilharzia Commission (of which Dr. Leiper of the London School of Tropical Medicine was in charge) proceeded to Egypt and there succeeded in working out the life histories of these schistosome worms which produce both

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vesical and rectal bilharziosis respectively." An outline of the findings of this commission is thereupon given—too long to include here—and not necessary, as the conclusions based upon their work may, from our standpoint, be summarized as follows:

1. Temporary collections of water are not dangerous after recent contamination.

2. All permanent collections of water such as sluggish, muddy rivers, canals, marshes, etc., are potentially dangerous, depending upon certain species of molluscs, the essential intermediary host.

3. Infected troops cannot reinfect themselves or spread the disease directly to others. They could only convey the disease to those parts of the world where a local mollusc could efficiently act as carrier.

4. Infection actually takes place both by mouth and through the skin. Recently contaminated moist earth or water is not infective.

5. Infection in towns may take place by the delivery of unfiltered, infected water.

6, Eradication can be effected without interfering with infected persons by destroying the molluscan intermediaries.

Resultant upon these late findings we are now in a position to predict what countries or localities could be infected with bilharzia disease based upon a survey of, and experiments on, their fresh water mollusca.

Whether infectable snails abound to any large degree in England and Europe the writer is unable to state. However, it seems reasonable to presume that the chances of these countries becoming endemic centers for bilharzia disease, even though numerous infected soldiers were in the country after the war, is a very remote possibility. The reasons for this presumption are: first, the presence of suitable fresh water mollusca is doubtful; secondly, the cool climate for the greater part of the year would have an inhibitory effect upon the eggs and myricidiae of these pathogenic trematodes; and thirdly, even were the two above-mentioned factors favorable instead of unfavorable, the inhabitants of those countries generally wear boots instead of going barefoot, as is the custom in Egypt, for example; and lastly, water supplies in European countries are better guarded against contamination and greater care is generally used in delivering filtered water for public use.

A discussion of the numerous other trematodes, nematodes and cestodes abounding in the tropics and parasitic to man will not be undertaken here. Not only would it unduly prolong this paper, but in most instances these produce conditions more properly requiring the attention of the clinician rather than the epidemiologist. The fact that any or all of them may exist in some of the soldiers returning from tropical campaigns will have to be borne in mind, and each case as it appears

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should have the proper measures applied to prevent others becoming infected, as well as the appropriate curative treatment.

Sanitary modes of life, as well as climatic conditions, together with the absence of suitable extrinsic hosts, in most instances protect against the great majority of these tropical parasites gaining a permanent foot hold in Euorpean countries.

LEPROSY

This disease while most common in the tropics is, and for a long time has been, existent pretty nearly throughout the globe. Manson (1*g*) says: "It would be easier to specify the tropical countries in which leprosy has not, than to enumerate those in which it has been ascertained to exist." Climate is not a bar to leprous infection, as cases are found as far north as Iceland as well as under the equator.

The fact that throughout Europe, including the British Isles, leprosy was a scourge during the middle ages shows that the disease would again spread there were feci of infection in sufficient numbers at large in those countries. While leprosy prevails to some extent in India, we can discount the liability of its importation and spread through the troops brought from India during the present war. These are picked men, and they are under such close surveillance that should cases develop among them they would undoubtedly soon be discovered and isolated or deported. Manson says that leprosy is common enough in Persia, Arabia and Africa, so there is some danger that British and other troops sent to those countries during the present war might, in individual instances, become infected. The belief in this possibility is strengthened by the fact that a number of cases are on record where soldiers of the American Army have received the infection in the Philippines and have later come to the attention of the health authorities both in the Philippines and in the United States. However, that European soldiers would become infected in sufficiently large numbers as to constitute a serious menace to the army or to the population of their home country is hardly a reasonable probability. The fact still remains that, owing to the long and uncertain period of incubation of leprosy, cases may develop in veterans of the present conflict long after the termination of the war. It therefore behooves the health authorities of Europe, as well as the health and quarantine authorities of Canada and the United States, to be on the look out for lepers among men, veterans of this war, who have seen service in tropical parts of the Old World.

VENEREAL DISEASES

It seems to be the common thing that young men in military service when separated from home and family, as well as the other restraints

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connected with home life in a civil community, often give unbridled rein to base desires, with the result that diseases of a venereal nature have an unusually high incidence among them. This is especially prone to be the case when lewd women without restriction are permitted to harbor themselves in the general vicinity of military camps.

According to all accounts, venereal disease for some reason seems to have had an unusually high incidence during the present European war. Tullidge (17) says: "In consideration of the great extent of the present European war and the enormous numbers of soldiers that each nation is putting into the field, the medico-military authorities are finding it more difficult to cope with the increasing prevalence of venereal diseases. In fact the statistics of the French, German and Austro-Hungarian armies show that the number of troops, both in the home zone and at the front, are acquiring venereal diseases with results that far outdistance the records of any previous war. In the campaign of 1870 and 1871, where the strength of the armies was far below that of the present mobilization, over 33,000 cases were recorded, or 42.6 per thousand of the averaged mobilized forces. Today, in the present war, the percentage has risen to a much higher figure, particularly in the Austro-Hungarian army." The same writer tells us that "Lues" forms more than 78 per cent of all cases. He also mentions the fact that a considerable number of the men contracted these infections knowingly, in the expectation that the manifestations of the disease would cause them to be placed on the invalid list and so escape the performance of duty.

Skinner (18), in an abstract from an article by Gaucher in a French medical journal says: "The chief point in this paper is that syphilis has increased both in the army and in the civil population from about 10 per cent before the war to about 16 per cent at present." A further review of the literature would no doubt furnish other paragraphs to show that venereal disease exists to a large degree among the personnel of the various European armies. To make this situation worse as regards the armies of the allies, the supply of salvarsan and neosalvarsan was cut off following the outbreak of the war. As soon as the relatively small stock was exhausted, the sufferers from syphilis among the allied nations were robbed of this valuable therapeutic agent to stay the ravages of their disease. Fortunately, however, substitutes have been found. Dudding(19), in recounting the experience of the Royal Naval Hospital, Haslar, England, with the new substitutes—kharsivan, manufactured by Burroughs Wellcome and Company, and also galyl, a French arsenical product discovered by Professor Mounerat—writes that while but limited experience was had with galyl, the impressions gained were very favorable; and with reference to kharsivan, that it

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has proved quite satisfactory, and practically no difference has been noticed in its action as compared with salvarsan and neosalvarsan.

The fact still remains that there will be a largely increased number of syphilitics among both sexes of the population of Europe after the war, and owing to the disastrous after-effects of the disease, with special reference to the parasyphilides, immigration officials, medical and otherwise, should be particularly on their guard against the entrance of immigrants suffering from syphilis and its complications, as well as other venereal diseases, after the close of the war.

TYPHOID AND ALLIED FEVERS

These fevers, formerly among the greatest scourges to armies in the field, today, due to our complete knowledge regarding their mode of spread by human "carriers," flies, and infected food and water; and thanks to the potent prophylactic weapon furnished by antityphoid "vaccine," have been brought under control. According to all accounts the European armies on both sides have freely used antityphoid vaccination as a preventive measure, with resulting great diminution in their typhoid incidence. Unfortunately antityphoid vaccine does not protect against the various strains of paratyphoid organisms, so quite a number of cases of paratyphoid fever have been reported among the various armies. But with the adoption of "mixed vaccine" (including paratyphoid organisms), these too have been brought under control.

The armies of the more backward European nations in a sanitary way recruited among the Balkan regions undoubtedly suffered severely from these fevers during the early part of the war. But upon the arrival of the American Red Cross Sanitary Commission, whose good deeds have already been referred to in this paper, prompt steps were taken to relieve the conditions.

Mendelson (20), a member of that commission, in a recent article describes his work in inoculating against typhoid, paratyphoid A, paratyphoid B and cholera, all the troops and prisoners in that part of Macedonia under Serbian control, and that part of Albania occupied by Serbia. It is stated that he and his colleagues inoculated in Old Serbia alone more than 120,000 soldiers and prisoners, and some of the civil population also was given the benefit of this inoculation.

Among the Teutonic armies exceptionally good results have been attained by wholesale antityphoid inoculations.

In a report (21) of abstracts of papers rendered at the Congress for Internal Medicine held at Warsaw during May, 1916, with reference to typhoid fever it is said that the entire German Army in the field was immediately immunized against typhoid, and later the troops throughout

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the base territory and the reserves at home were thoroughly vaccinated against the disease, and a second vaccination was practiced six months later. As a result, in December of 1915 certain armies which had a strength equal in number to the population of a large city showed no cases of typhoid fever at all.

Such measures as these, with their corresponding beneficent results, reduce not only the number of typhoid cases to be cared for, but, what is even more important to Europe as a whole, and to us also, cause a great diminution of chronic typhoid carriers who would threaten the health and lives of communities wherein they might reside, the United States included, after the close of the war.

WHAT WILL BE THE EFFECT UPON DISEASE CONDITIONS OF THE UNITED STATES?

Having discussed the probable effect of the war upon disease conditions in Europe, taking up individually the most important diseases of a dangerous, communicable nature and drawing probable conclusions relative to their spread, with especial reference to those of an exotic character which might secure a foothold there and so threaten the United States, it now remains to discuss what effects, if any, will be produced upon, or in, the United States by these probable conditions in Europe.

Whatever the disease conditions in Europe after the war, the United States is threatened only directly and commensurately by the volume of immigration that will come to our shores from those countries.

Though there has been considerable speculation as to the character and amount of immigration which may come to us after the war, there is no unanimity of opinion on this subject. As quoted from Hagler above, many think that there will be an increased tide of immigration to the United States from Europe upon the conclusion of peace, and at first blush such would seem a likely probability. On the other hand there there are numerous factors that may affect such a result. First, owing to the enormous number of men killed and permanently injured in action during the war, together with the industrial rehabilitation that must take place after the war in the struggle to gain commercial advantage temporarily lost during its progress, jobs should be plentiful and wages high abroad, so one strong incentive for men to emigrate will be removed. Furthermore, it seems probable that laws will be passed by the ruling bodies of various European countries discouraging or even prohibiting the emigration of physically fit males, as their labor will be needed at home. These factors will be counterbalanced to a certain degree by the fact that women have taken the places of men in many occupations and industrial pursuits formerly almost exclusively

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occupied by men. Many of those women will refuse to give up their jobs, and their employers will no doubt wish to retain them in many instances, as it is and always has been the custom to pay women a smaller wage than men for the same class of work.

Nevertheless, after peace is concluded we may undoubtedly expect to find an unusually large number of women and children seeking admission to the United States who have been robbed of their male support by casualty in the war, and who will come to join relatives in this country and seek now opportunities here.

Of course there will be a flood of people at present domiciled in the United States who will rush to Europe as soon as peace is concluded—some to seek relatives and friends, some for commercial reasons; and some to view the altered appearance of Europe, the result of the titan conflict. The vast majority of these will return, and some will bring relatives or friends back with them. Should it be granted that disease conditions in Europe will be changed for the worse, the result of the war, there is a certain amount of danger that some of these people may incur prevailing infections while abroad and introduce them into this country on their return. Natives or naturalized citizens of the United States cannot be debarred upon their return to their home land by immigration authorities, even though they may be suffering from certain loathsome or dangerous contagious diseases. Of course, should any of these people, citizens or aliens, be suffering from yellow fever, cholera, smallpox, typhus, plague or leprosy which are recognized as quarantinable diseases by the Quarantine Regulations of the Treasury Department of the United States made by authority of law, they will be detained and subjected to such measures and treatment, together with the vessel they arrive in, as is deemed necessary by the officers of the Public Health Service authorized by law to enforce the above-mentioned regulations.

It may be necessary to strengthen our maritime quarantine defenses after the war, but it is safe to say that that matter will be suitably handled by administrative action. The plans and framework are already in existence and trained officers are available wherever needed.

If for sake of argument we admit that there will be an increased flood of immigration to our shores following the conclusion of peace, let us consider briefly in detail the exotic and other diseases which might be brought to or implanted into Europe the result of the war, and analyze, if possible, the chances of their gaining access to this country through immigration; and, if introduced, the liability of their spreading or gaining a permanent foothold here, and so effect a change in the present prevailing morbidity of the United States.

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MALARIA

We have not admitted above that malaria should become unduly prevalent in Europe, the result of the war. However, veterans or immigrants may arrive from endemic centers. Malaria is not named among the diseases excludable or even certifiable under the regulations made in accordance with the law governing the admission of aliens into the United States (22). It may be taken cognizance of, however, under either of two classes of defective and diseased aliens specified in Treasury Department Regulations governing the Medical Inspection of Aliens by Officers of the Public Health Service. Cases may be certified under Class "B"—"A physical defect likely to render the person concerned a dependent or materially affecting his capacity for self-maintenance;" or, under Class "C": "Aliens who present defective or diseased conditions of a character less serious than the foregoing, but which, nevertheless, must be certified for the information of immigration officials and boards of special inquiry under the general provisions of section 17 of the law."

It must be stated that with the system of medical inspection of immigrants at present in vogue, unless the alien on arrival was undergoing a chill or presented a feverish appearance, it is improbable that he would be detected. In other words, no system for the detection of malaria carriers among arriving aliens is at present in use. In fact it is doubtful if the condition is serious enough to warrant the great amount of time and personnel necessary to perform the laboratory work connected with the blood examinations of the nearly one million immigrants that normally land at New York in a year. That a large percentage of malaria carriers could be apprehended by these means is possible, even if at the present time they are neither necessary nor practicable. Malaria is already pretty widely spread throughout the United States, especially in the south, and wherever infectible Anophelos are present in sufficient numbers throughout the greater part of the year, it is believed sufficient native human malaria carriers now exist to render negligible any comparatively small increase in their numbers by additions of malaria carriers from among entering aliens.

TRYPANOSOMIASIS

It was concluded that this disease is unlikely to spread in Europe for the reasons set forth above. While trypanosomiasis is not named in the Immigration Laws or Regulations as an excludable disease, by inference it comes under the same classification with diseases mentioned under Class "A" as dangerous and contagious, such as filariasis

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and bilharzia, and therefore those aliens found afflicted with the disease can be certified and excluded. However, even if any such should land here undetected, it is not believed that the disease would spread in this country for the same reasons mentioned above as militating against its spread in Europe.

LEISHMANIASIS

It could not be definitely stated whether this disease would become implanted in Europe, the result of the war, though it seemed probable that it would not. The same may be said with reference to the United States, saving that it might be sufficiently warm and humid in certain of our southern States to foster the spread of the disease, providing it was introduced in sufficient amount and that the proper insect host—whatever it may be—is present. This very uncertainty must give us pause and would warrant extra precautions being taken to prevent the introduction of this exotic disease into the United States, that we may be assured that the danger of its spreading will not exist. Though not specifically mentioned in the Immigration Regulations, it would certainly come under the class of dangerous contagious diseases, and therefore excludable when found. Delhi boil, believed to be one of its skin manifestations, would, if present on the face or hands, be almost certain to be noticed. It is believed that this condition could justifiably be certified as a loathsome contagious disease under Class "A" in the same category with actinomycosis, mycetoma and leprosy, which are specifically mentioned under this class. It would certainly seem that blood examinations, particularly of aliens arriving from southeastern Europe and Africa, should be made after the close of the war to detect carriers of Lieshmania, especially if any person with Delhi boil were noted among them.

RELAPSING FEVER

An alien arriving at a United States port with relapsing fever, if at that time suffering from one of his periodical relapses, would certainly be picked up either at quarantine or by the medical inspectors of immigrants. Under the present arrangements he would be detained until accurate diagnosis of his condition was made, or until recovered. If he succeeded in landing during one of his periods of apyrexia, unless he should gravitate to a place where bed bugs were prevalent—neither common, nor yet uncommon in the United States—his disease would not likely spread. In any case it would not spread far. Sufficient is now known about the disease to be able to control its spread without great difficulty, and, generally speaking, conditions regarding sanitation

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and personal hygiene in this country are sufficiently good to warrant a prediction that no widespread epidemic would occur.

YELLOW FEVER

The United States has suffered from epidemics of this disease on more than one occasion in the past. The last epidemic occurred in New Orleans in 1905, which was promptly stamped out by the United States Public Health Service using weapons at our command now that the transmitting agent is known. Regarding no disease are we better prepared to combat, or our national quarantine stations better equipped to handle and protect the country against than yellow fever. We need no longer be alarmed regarding the introduction and spread of yellow fever in this country in epidemic form. Though we are no longer threatened from this disease, and hardly likely to be from the direction of Europe, we have a thoroughly efficient system and organization now in this country not only to prevent its introduction, but to stamp out yellow fever promptly should it in some inconceivable manner be again introduced. It would be handled in the same way and suppressed as it was in New Orleans in 1905.

DENGUE FEVER

Dengue already prevails in certain sections of the south. That it has not spread to other States further north is believed to be due not so much to the absence of the necessary variety of Culex mosquito, but that the conditions of continuously high atmospheric temperature and humidity which are prerequisite to its spread are absent. The infectible portion of the southern States is believed to be already infected, so dengue as a problem connected with immigration from Europe can be practically disregarded.

BUBONIC PLAGUE

This is one of the quarantinable diseases, and a system based upon appropriate regulations is already in effect to prevent the introduction of plague-infected rodents from abroad. However, plague already exists in certain portions of the United States. During the early summer of 1916 plague-infected ground squirrels have been found in certain of the bay counties of California, where the infection has been known to exist since 1908, and where every effort has been put forth by the Public Health Service to stamp it out. It is believed to be only a matter of a short time when this will be accomplished, corresponding to the manner in which the disease was eradicated by the same service from San Francisco in 1907-8.

Similarly, plague-infected rats continue to be found at intervals in

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New Orleans, where the Public Health Service has been conducting plague eradicative measures for some time, and which, so far as human cases are concerned, have been effective, no human cases having occurred there since October, 1914.

As far as human plague cases are concerned, excepting pneumonic plague, they can almost be disregarded from an epidemiologic standpoint. It is believed to be rare indeed when bubonic plague spreads directly from one human being to another. Plague-infected rodents, with their infected fleas, are the danger sources of origin. We are and for a long time have been menaced by plague from oriental sources on our western coast, and should plague become epidemic, or even endemic in Europe, which is not a likely probability, it would not be a new menace but only one from a new direction. The same protective measures regarding rat guarding and fumigation of ships required by the quarantine authorities on the west coast would be put into effect and rigorously enforced at ports of entry on the eastern coast. While by these means the menace would not be removed, its dangers would be greatly minimized.

UNDULANT OR MALTA FEVER

The belief was stated above that the probabilities of Europe becoming infected generally with Malta fever from causes originating in the present war, was, to say the least, rather remote. Such being the case, we need not further concern ourselves with it as a possible menace to the United States. Its possibilities of introduction from sources on the Mediterranean littoral will probably remain the same after the war as preceding it. In passing it should be remarked that undulant fever is not unknown in this country. Yount and Looney (23) reported five human cases of this disease occurring in Arizona during 1912 and early 1913. These were confirmed by laboratory procedure, and each case was in some way connected with the goat-raising industry.

It is believed that far more danger exists in importing the disease into this country with Maltese or Angora goats, than that it may be brought in through the persons of immigrants. This being the case, if they do not already exist, proper quarantine restrictions against infected goats should be enforced by the Department of Agriculture rather than by the public health authorities.

CHOLERA

It was stated above that potentially there appeared to be greater danger that cholera might assume epidemic proportions in Europe during or shortly after the close of the war than regarding any other dangerous communicable disease. If proper precautions are taken and

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other conditions are unfavorable, this may not occur. If it does, the United States quarantine authorities will need to be especially on their guard to prevent its introduction here. By the imposition of proper quarantine measures it is believed it can be successfully kept out.

During the summer of 1910 when cholera was unduly prevalent in Russia, and in the summer of 1911 while cholera was epidemic in Italy, extraordinary quarantine procedures and restrictions were put into effect by the Public Health Service with regard to immigration from those countries. Not only were certain precautions required at ports of embarkation by officers of that service detailed abroad, but stool examinations were conducted in the laboratory of all immigrants arriving from infected centers to shut out vibrio carriers who were apparently well. During the period between June 13 and October 1, 1911, there arrived at New York ten vessels upon which cases of cholera appeared, and one vessel with a clean bill of health upon which two healthy vibrio carriers were found. A total of 35 cases of cholera were diagnosed, of which 12 occurred on vessels at sea, 6 on vessels arriving at quarantine, 13 developing at quarantine, and 4 developing in New York and vicinity. Of the 4 cases developing in New York and vicinity, 2 were passengers who arrived on an infected vessel, one was in a discharged quarantine employe developing on Staten Island, and one was in a Spaniard who had resided in New York City two weeks, and the source of whose infection could not be traced. The first three cases mentioned occurred prior to the routine examination made of persons for carriers had been put into effect, and would probably have been detected if their release from quarantine had been made dependent upon such examination.

Should cholera again threaten us from Europe, the same measures and restrictions would be promptly put into effect by the United States quarantine authorities, and without doubt with results equally if not more successful than was the case in 1910 and 1911.

TYPHUS

Owing to its prevalence in the Balkan States and adjoining territory during the present war there is strong liability of typhus being brought to our shores by immigrants from those sections following the close of the war. Now that we are familiar with its mode of spread we do not stand in the same terror at the mention of typhus as formerly. It must also be remembered that we have or have had a strain of typhus in this country for many years. It was for some time known only as Brill's disease in New York, until Anderson and Goldberger (24) in 1912 by experimentation demonstrated the identity of so-called Brill's disease to typhus fever.

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Furthermore we are at present threatened by typhus on our southern border. The disease is known to be more or less prevalent in Mexico, and a few cases have recently been reported in southern California and other border States, in the persons of Mexicans or others who had been in contact with infected Mexicans. The Public Health Service for a number of months has had in effect border quarantine measures calculated to prevent its introduction as effectively as may be under existing circumstances. An employe of this service has already given up his life from typhus contracted in line of duty at El Paso, Texas, during October of 1916, while engaged in the work of preventing the introduction of typhus fever into the United States from Mexico. He is but one—the latest—among a number of officers and employes of the Public Health Service who have lost their lives in the performance of public duty while engaged in operations to prevent the introduction or interstate spread of dangerous communicable diseases throughout the United States.

Plans and experiments have already been made by the Public Health Service looking toward the adoption of the most effective means to guard this country against typhus. In a recent article by Grubbs (25) there is outlined the studies that have been made during 1916 at the Boston quarantine station under the United States Public Health Service, which have resulted in the adoption of a method of treating persons and their effects to destroy lice by means of a gasoline soap spray and shower bath and of treating clothing and baggage with a vacuum hydrocyanic gas process. Evidences and assurances are therefore to be had that appropriate means and measures will be put into effect at all quarantine stations, if necessary, to safeguard the United States from typhus upon the close of the war.

SMALLPOX

While there is no evidence that smallpox will be unduly prevalent in Europe after the war, even if such were the case it need not cause serious concern to the United States. It is one of the quarantinable diseases and by detention and vaccination one of the simplest to control at quarantine, as well as in municipalities by the local health authorities.

There is more or less smallpox constantly prevalent in all parts of the United States. The consensus of opinion is, however, that the strain of smallpox now in this country has been rendered less virulent by vaccinations or other cause, so that the death rate is far below what was formerly quoted for this disease. Occasionally a new more virulent strain is introduced within our borders from Mexico or elsewhere, in which little epidemics the mortality attains its former quoted high per-

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centage. It is to prevent the introduction of those foreign virulent strains that the quarantine authorities have to be constantly on the alert to detect cases suspicious of smallpox in passengers arriving from abroad, no matter what their origin.

FILARIASIS

This disease is specifically mentioned as one of the excludable dangerous contagious diseases by the regulations governing the medical inspection of aliens. Should any persons afflicted with elephantiasis or well-marked symptoms of lymphatic varix have the temerity to attempt to emigrate to this country, they would be detected with certainty and deported with equal certitude. Those having the microfilariae in their blood, but without other symptoms, would not be detected without special blood examinations during both day and night hours. Under present arrangements these cases might very well enter this country undetected. While the writer is cognizant of at least one case of filariasis which was detected in a Chinaman upon blood examination by the medical officer on duty at Angel Island immigration station, California, whose suspicions were aroused through some circumstance connected with the case, it cannot be stated at present whether the necessity is sufficiently urgent to warrant a routine microscopical blood examination of arriving aliens generally, in the hope of thereby detecting a few microfilaria carriers.

Though the *Culex fatigans* mosquito is said to be the principal transmitting agent, several other varieties of mosquitoes have been suspected of being the hosts and vectors of microfilariae, the result of artificial experimentation. The writer is unprepared to state whether the species of mosquitoes native in the United States could, on occasion, serve as carriers and infecting agents. It would seem probable that there should be some. However, climatic conditions may play a prominent part in relation to the dissemination of the disease by mosquitoes. While *Culex fatigans* are not known to abound in California, several other varieties of Culex are prevalent, the most prominent of which in the bay regions is *Theobaldia incidens*. Either this insect cannot play the rôle of host and vector in this disease, or else the climate in the bay region is unsuitable, as it seems more than likely that there must have been quite a number of microfilaria carriers introduced into California in the persons of Chinese immigrants prior to the passage of the Asiatic exclusion act.

Filariasis and elephantiasis is not uncommon in Porto Rico and other islands of the West Indies. Either conditions as regards insect host or climate must be generally unfavorable to its spread in the

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United States, or else the infection does prevail undiscovered in certain sections of this country. However this may be, we have it within our power to effectively keep the infection from entering the United States from abroad by laws already in effect, and by the imposition of measures such as thorough physical and blood examinations of all arriving aliens from endemic centers.

DYSENTERY

In this discussion we will consider only dysentery of protozoan origin.

Amebic infection is classed by the regulations among the dangerous contagious diseases (Class "A"), the deportation of persons afflicted with which are mandatory under the law. This, however, is a condition hard to discover by ordinary means. Except in the last stages there is nothing suggestive in the appearance of the patient, unless, of course, his condition be so acute as to confine him to bed. Cases of amebic dysentery of apparently endogenous origin are occasionally met with in the United States, with especial reference to California. It is impossible to say whether those pathogenic amebae have been implanted in that State by infected Chinese during the past who were garden truck farmers, or whether a pathogenic native variety really exists. Numerous ameba carriers are found among Chinese and Japanese immigrants at the Angel Island, California, Immigration Station, where routine stool examinations are conducted to determine the presence of hook worm carriers. It has been found a considerable undertaking to conduct these comparatively few stool examinations at San Francisco, and one can imagine the formidable undertaking it would be to conduct routine stool examinations at a port such as New York where several thousand immigrants often arrive in a single day. It is questionable indeed whether such an undertaking would be justifiable, to say nothing of its annoyance and delay to passengers, at a port such as New York in order to detect the comparatively few carriers of *Entameba histolytica* that might possibly arrive. That it could and would be done if the situation demanded it we may accept as a matter of course.

BILHARZIA DISEASE

Considerable time was taken up above in the discussion of schistosomum infection, with especial reference to its possible introduction and spread in Europe. In the absence of a knowledge relative to the fresh water mollusca (snails) in the United States, no conclusion can be drawn here relative to its probable spread if cases in sufficient numbers were introduced into this country. If the requisite variety of these

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molluscs are present in our southern States the disease might become established there, though for climatic reasons it seems very doubtful that the disease could obtain a foothold in our northern States.

Bilharzia disease, or *endemic hematuria*, is an excludable disease being mentioned among those under Class "A" in the regulations governing the medical inspection of aliens. It is not understood that those afflicted with the disease ordinarily show any marked objective symptoms, hence, without microscopical stool and urine examinations in order to find the ova, it is difficult of detection. However, it would seem advisable that aliens arriving from points in Asia Minor and northeastern Africa who present an anemic or cachectic appearance should be subjected to urine and stool examinations as a precautionary measure. That this procedure should be imposed on other immigrants seems hardly necessary under the conditions. However, we have in this procedure a means at our command, to be applied if necessary, by which we can effectively shut out all those suffering from bilharzia disease.

LEPROSY

Leprosy being one of the quarantinable diseases, no difficulty is encountered in deporting cases of the disease recognized at ports of entry.

While leprosy cannot be said to be common in the United States, there are quite a few lepers under detention at San Francisco, Boston and at the leprasorium in Louisiana, as well as at points in our insular possessions, Culion, P. I., Molokai, T. H., and San Juan, P. R. Lepers are occasionally picked up at San Francisco quarantine en route from points in Asia, the Philippines or Hawaii. In 1913 an investigation conducted by correspondence by the Public Health Service definitely located 148 cases of leprosy in the United States. The bulk of these cases were persons native born. During the fiscal year ended June 30, 1915, the record of cities in the United States shows that one new case was reported in Detroit; three in New York; 1 in Philadelphia; 1 in Oil City, Pa.; 2 in St. Louis; 5 in Los Angeles; 2 in San Francisco; 1 in San Diego, Cal.; 1 in Tacoma, Wash.; and 2 in Tampa, Fla., a total of 19. There are probably numerous other undiscovered cases at large in the United States, as it is believed that the average practitioner in this country is not sufficiently familiar with the manifestations of leprosy to make an accurate diagnosis until the disease has reached a stage of mutilation that renders the condition obvious. It is only those cases that come to the attention of skin specialists as a rule in the larger cities that an early accurate diagnosis is made. At any rate this problem has been felt to be sufficiently important and serious to warrant

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federal control, and to that end a bill has been introduced into Congress providing for the national control of lepers.[1]

As previously stated, it is thought not unlikely that there may be an unusual number of lepers found in Europe during the early years following the close of the war. These are most likely to be found in veterans who served in Asia Minor, one of the notorious hotbeds of the disease since biblical times. Indeed there is some liability of such cases being apprehended in the United States within the next few years. Owing to the long period of incubation of leprosy these men could immigrate to this country and pass immigration and quarantine inspection during that period and some months or years later be found to be lepers.

Should they be detected within one year from date of arrival they may yet be deported, but subsequent to that period they will be a charge upon the State where found, if not upon the federal government.

Inasmuch as leprosy is classed as a loathsome contagious disease in the immigration regulations, the deportation of persons suffering from which is mandatory, as well as being one of the quarantinable diseases, there is a double filter—as it were—through which the leper has to pass in order to gain admission into this country. The quarantine and immigration officials of the United States will need to be especially on the alert to detect early cases of this disease in arriving aliens following the close of the war.

VENEREAL DISEASE

As stated above, various forms of venereal disease have been found to be unusually prevalent among the European troops during this war. The same condition may be expected to obtain both among the veterans and the civil population in Europe for some time after the close of the war.

We do not want cases of European syphilis, recent or old, in this country to swell the number of human derelicts already crowding our hospitals, jails, almshouses, and insane asylums; but under present arrangements we are pretty liable to receive a number of them.

All forms of venereal disease are classed as deportable, loathsome contagious diseases in the immigration regulations, which read: "Demonstrable syphilis in an active communicable stage." The word "demonstrable" may have an ambiguous meaning. If by demonstrable is meant clinically evident, it is an entirely different thing than demonstrable by laboratory procedure. If the former interpretation be the correct one, it is obvious that only persons with evident cases of secondaries will be apprehended and certified. Primary lesions in the

[1]Since date of writing this bill has passed both Houses and become a law.

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usual location are almost certain to go undetected. Cases of gonorrhea likewise for the same reason. Tertiary syphilis, depending upon the location and extent of the lesions. The parasyphilides are a still different question. If apprehendeds these would of course be certified under that portion of Class "A" which relates to insane aliens. Their apprehension would depend upon the nature and degree of the manifestations, and upon the astuteness and acumen of the medical inspectors of immigrants—admittedly a difficult matter under the conditions that obtain.

It is true that we have at our command in the Wassermann reaction a means of detecting the great majority of these cases; but that it would be at all practical to apply such a complicated and delicate procedure to such enormous numbers of persons as arrive at Ellis Island, for instance, is extremely doubtful, even if the regulations could be interpreted to permit the use of such a measure in the demonstration of syphilis in arriving aliens. Of course it is within the realms of possibility that it could be so applied. The complications of such a procedure would not end with the diagnosis and certification of the disease in certain aliens. It would only then begin in an administrative sense. The majority of such certifications would resist deportation, and appeals would be taken to boards of special inquiry, and from them on up to the Secretary of Labor. Due to the known variations in results with the Wassermann reaction by different technologists even using the same blood, taken in conjunction with the other known fallacies of the reaction, it is quite questionable whether the results obtained with its use, in aliens in whom syphilis could not be demonstrated clinically, could be justified in a legal sense.

Therefore the statement is made that there is more of a liability—which approaches a certainty in this case—that Europeans suffering from syphilis and its after effects may become lodged in this country subsequent to the war than can be reasoned a probability as regards any other disease.

TYPHOID FEVER

Typhoid fever here will stand for the various paratyphoid infections as well, for, generally speaking, what is true for one is true for the others.

It was shown above that due to the enormous number of antityphoid inoculations practiced by the European armies, with the possible exception of those of Great Britain, typhoid and allied fevers have not assumed high prevalence in this war. In fact the disease may be said to be well under control. For these reasons typhoid will probably be less prevalent in Europe for a number of years after the war than it perhaps would have been had there been no war.

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As is well known, typhoid fever has a high prevalence throughout the United States, excepting only a certain few cities. The incidence is very much higher here generally than it was in Europe prior to the war. It is therefore evident that we have little to fear from Europe as regards typhoid fever after the war. Even though the conditions were otherwise, and a considerable number of typhoid carriers gained entrance into this country after peace is once more established—which would not be a difficult thing for them to do under existing arrangements—they should cause us little concern.

In the United States, where in the registration area the case incidence of typhoid fever averages from 150 to 200 cases per annum per 100,000 inhabitants, and when it is figured that 4 per cent of convalescents from typhoid fever become "chronic bacillus carriers," the introduction of a few typhoid bacillus carriers from Europe would have but little effect either on the morbidity or mortality from typhoid fever in this country.

CONCLUSIONS

From the foregoing we may conclude that, with the exception of venereal diseases, of leprosy probably, and typhus, plague and cholera possibly; and also, perhaps, one or two parasitic diseases of tropical origin, the morbidity of Europe should not be changed after the war, so far as dangerous communicable diseases are concerned, from what it was preceding the inception of this terrible and amazing conflict.

Such being the case, we in the United States should not feel needless alarm as to the outcome from an epidemiologic standpoint. By no means should we revel in a fool's paradise. We should face the facts with a calm, scientific attitude, and be prepared for eventualities whatever they may be; and this, it is believed, fairly expresses our present attitude.

It has been shown above that our quarantine defenses, already in existence, are maintained both as regards personnel and material in a State ready to cope with whatever condition that may be thrust upon us. An additional barrier is interposed between us and the afflicted European hordes in the shape of the United States Immigration Service with its accompanying medical inspectors, who are officers of the Public Health Service especially trained in this work. Adequate laws, it is believed, are already in existence to shield us from being overrun by aliens that are diseased and unfit. By administrative action, which would be forthcoming in time of need, appropriate additional precautions in the shape of known and exact laboratory procedures can be imposed to still further rule out those suffering from the more obscure tropical complaints.

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Knowing that we are already prepared for the worst, let us then face the future with confidence. In the meanwhile, as so aptly stated by our editor in the June number of THE MILITARY SURGEON, in discussing the possibilities of the present European war upon the spread of disease infections: "Upon our maritime quarantine and immigration officers resolves the difficult task of being the 'watchers at the gates.'"

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J. RAYMOND HURLEY,
P. A. Surgeon, U. S. P. H. Service.

CARREL ON THE TREATMENT OF WAR WOUNDS

The Army Medical School was recently honored by a visit from Dr. Alexis Carrel, during which the faculty, student officers and a few fortunate guests listened to a most interesting story of some of the results of his experiences in the war hospitals in France.

THE MILITARY SURGEON's notes do not do justice to the narrative, but incomplete as they are, what they have preserved of the extemporary address is so valuable that, with Dr. Carrel's permission, we venture to publish them.—*Acting Editor.*

I did not know until this morning that I was to have the honor of addressing you, therefore have made no preparation. What I have to say is about war surgery, and must be of the most sketchy character.

I had the privilege of being for twenty-nine months with the French Army, and of serving first at a base hospital which was located at a point

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about two or three days distant from the battle front, and afterwards to work in a research hospital organized by the French War Department and where are the laboratories supported by the Rockefeller Foundation. That hospital is located at a distance of seven or eight miles from the German trenches. Needless to say I saw almost every kind of war wound. I was allowed to go to many of the places in France as well as in Belgium, to see a number of base hospitals, first-aid stations, and what they call ambulances, identical I believe with the field hospitals of this country.

It was most interesting to follow the evolution of the treatment of wounds, and I believe I can profitably give you a brief sketch of the progress of such treatment from the beginning of the war to the present date, so that you may therefrom determine what we should do in the future care of wounded.

At the beginning of the war, we had the idea that all gunshot wounds were sterile. The result of this belief was that the wounded, with first-aid dressings only, were sent directly from the battlefields to the base hospitals, which were often located at several days' distance. It was soon found that some bullet wounds were sterile but in all cases of shell wounds there was always more or less severe infection. When I started to work, in August, 1914, at one of the base hospitals located two or three days' journey from the lines, all the wounded we admitted were infected. They were coming in directly from the first-aid stations, with all kinds of infection. At that time the death rate was only from 2 to 4 per cent, because the worst cases had already died or had been kept in the base hospitals located nearer the battlefield. There were a number of amputations even for flesh wounds, for often they were complicated by gas gangrene or other infections. During the last months of 1914, we tried all kinds of treatment, alcohol, phenol, iodine, hydrogen peroxide, iodoform, etc. But no real progress was made, and we did not succeed in stopping the suppuration of wounds. There were a considerable number of cases of tetanus which yielded a very high death rate. At that time, these conditions prevailed everywhere in France.

In November and December, 1914, I visited many of the field and base hospitals, in order to learn everything I could about infection. One hospital was located about nine miles from the German trenches, in a very dangerous district. It was extremely hazardous to get the wounded to it, and the result was that often ten or twelve hours would elapse between the time of the wounding and the arrival of the patient. Every wound, of course, was infected. The surgeon told me on my arrival that he had taken care lately of a hundred cases of gaseous

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infection and that the death rate had been more than 50 per cent. In these statistics he included also the cases of local gaseous infection, which are really not dangerous. The results of the treatment of the fractures of the thigh in the same hospital at that time were disastrous. These cases were also generally followed by amputation or death, or by both. There was only one knee case which had recovered without amputation. In many other hospitals the results were not so bad, but every wound was infected. Of 100 amputations, seventy or eighty were performed on account of infection.

These conditions were primarily due to the fact that the hospitals were inadequately organized, the equipment was not sufficient and in many places the surgical heads were not surgeons at all, often dentists, obstetricians, and sometimes, old family physicians. But the main cause of the high death rate was that the surgeons did not appreciate that it was absolutely essential to open widely every wound as soon as possible, and to remove the foreign substances it contained, if they wished to prevent gaseous and other infections. Colonel Uffoltz, medical director of an army corps, understood as early as May, 1915, that the future of the wounded depended entirely on the rapid transportation to a hospital where competent and thorough surgical care could be given to him; that is, where the wound could be widely opened under aseptic conditions. A few men understood this principle, but it took a long time before it was finally admitted that time is a very important factor in infection; and that when a wound is widely opened the life of the patient is almost safe.

To provide for the rapid transportation, a large number of automobiles has been acquired. The drivers are trained to bring the automobiles as near as possible to the trenches. The wounded are brought through the "boyaux" to the automobiles. It is very difficult and arduous work to bring the wounded through the trenches. Often the bearers have to carry them two or three kilometers in darkness, through mud, before they reach the ambulances. These men cannot be too highly praised for the devotion with which they do this thankless work. It takes from five to twenty hours to get a wounded soldier from the trenches to the hospital. No time should be wasted at intermediate dressing stations.

Since the wounds have to be opened at the earliest opportunity, it follows that the field hospitals have to be located as close as possible to the trenches. So a number of hospitals are now situated from four to ten miles from the fighting lines. These hospitals have to be very large because of the likelihood of a great number of wounded being brought in suddenly, and because after the operation it is dangerous to immedi-

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ately send the patients to another and more remote hospital. A hospital of from two to five hundred beds will not take care of the number of wounded that may come after an attack of half an hour. In the beginning of the war, our "ambulances" were small units, and could care for two or four hundred patients. With the progress of the war it became more and more apparent that it was necessary to have much larger field hospitals. Today hospital units of 3,000 beds at least, are used in the French Army. These hospitals are made of portable houses, and not of tents. They should be as comfortable as possible, and the money spent in these hospitals is a very good investment, because of the fact that operations performed under good conditions save the life of many men and a man has a value of more than $6,000. These hospitals are located on a railroad branch, for the sending out of the patients, and at a point which can be reached easily by the automobiles coming from the battlefield. Smaller hospitals of twenty or fifty beds, for abdominal operations, have been established at several points a few hundred yards from the line. They are generally underground. But their number cannot be increased because the supply of trained surgeons is limited. These surgeons should instead be in charge of very large hospitals, where they could watch and direct the work of the less trained operators, as well as perform themselves the more difficult operations.

There was practically no equipment for operating rooms at the beginning of the war. In December, 1914, I saw not even an autoclave in the operating room of some hospitals. The unpreparedness of the Army Medical Corps was due to the fact that nobody in France thought seriously that there was a possibility of war. As soon as the disastrous results brought about by the lack of equipment were encountered, sterilizers and other apparati were provided as rapidly as possible. It was found by experience that the operating rooms for war surgery should be different from those used in times of peace. In the field hospitals, the wounded are brought suddenly in large numbers and it is necessary to have operating equipment for several hundred or several thousand wounded. Under the direction of the Medical Department of the War Office, a special outfit for operating work was devised. It is called the "Ambulance Chirurgicale Automobile." It is composed of a portable operating room, as well as a dressing room, sterilization room and an X-rays room. A steam boiler provides steam for the large sterilizer, for the radiators in the operating room and other rooms and also power for electric light and other appliances. The entire paraphernalia is carried on four automobile trucks. In the larger field hospitals of over 3,000 beds, three or four of these operating units, with their surgical staff, are used. This organization of operating facilities was a great

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progress. But it does not seem to be sufficient, because the output of such operating rooms is too small for the very large number of wounded who have sometimes to be operated upon in a few hours. It would be advisable to devise a special type of operating plant where surgeons working in teams could operate on four or five hundred patients in twenty-four hours. Four perfectly equipped operating rooms working together could handle in twenty-four hours about 2,000 patients. Some preliminary plans have been made through my instigation, by Mr. Charles Butler, but they should be worked out more completely in order to be made practical.

The general organization for the care of the wounded near the lines, which has been brought about lately under the direction of the Under Secretary of War, Mr. Godart, is a big advance. Every wounded can be operated upon within the first twenty-four hours except during the big attacks. The best practical results have been obtained in flesh wounds and cases of fracture. The number of cases of gas infection has greatly diminished, less septicemia is observed and much less amputation of limbs is necessary. But it is still far from being satisfactory. We found that more than 90 per cent of the patients coming in from the hospitals are infected. Almost every wound suppurates, but the infection is less dangerous and the death rate has been certainly decreased in a great measure. If we compare, for instance, the results obtained in the beginning of the war in the treatment of fracture of the thigh, with the results observed a few months ago by the use of a good organization and the technique we have developed in our research hospital, for the treatment of fracture, we find a startling difference. During the battle of last summer, in an ambulance located under shell fire, Dr. Hornus succeeded in sterilizing and suturing after from fifteen to twenty days eleven cases of fracture of the femur out of fourteen. The two other patients recovered; the fourteenth died from hemorrhage before anything could be done for him.

These results show that if new and better methods of treatment are used in conjunction with rapid transportation of the wounded and good organization and equipment of the hospitals, important progress can be obtained.

The clinical researches made at the experimental hospital at Compiegne have shown that by using proper technique, wound infection can be almost entirely controlled and that pus can be eliminated completely from the hospitals. This conclusion was the result of the work that Dr. Dakin and I started at the end of 1914, in France, and continued later with the help of Drs. Dehelly, Dumas, Daufresne, Jaubert, Woimant, Vincent, Bernond, and Lecomte de Nouy. It had become apparent

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to me at the beginning of the war, that the main cause of mortality among the wounded was infection and that all our effort should be directed toward a method by which infection could be suppressed. It was also evident that on account of the difference of the resistance of tissues, with normal circulation, and of microorganisms, sterilization by a chemical substance was possible; and that a bactericidal substance applied under a certain concentration and during a certain time, would kill the microbes without markedly injuring normal tissues. Dakin found a number of substances which, being but slightly caustic for the tissues, can be used in a wound in a sufficiently strong concentration and during the time necessary to bring about sterilization. We selected the simpler of these substances; that is, sodium hypochlorite without alkali in a concentration of 0.5 per cent. This surgical hypochlorite is designated under the name of Dakin's Solution and it should be prepared exactly according to the directions of Dakin and Daufresne. If not, it becomes caustic for the tissues, or inefficient against the bacteria.

It should be understood that the application of Dakin's solution by means of ordinary surgical technique does not bring about the sterilization of a wound. The success of the method by which an infected wound is made aseptic, is due not only to the bactericidal power of the substance used, but mainly to the procedure by which the substance is applied. Certain conditions of contact, of concentration and duration of application make its action efficient. The method must be used as a whole with no modifications of its parts. I am not able, in this short time, to give a description of the technique which is used in the sterilization of a wound. The principle of the method is to bring the bactericidal substance in close contact with the microbes under a given concentration and during a given time. Therefore, the tissues are to be very widely opened, any foreign bodies removed and small rubber tubing inserted in every recess of the wound. Afterwards the fluid is brought in contact with every part of the wound at the proper concentration. The concentration can be maintained constant only by bringing fresh fluid, all the time, to every part of the wound. Therefore, every two hours, the wound is flushed with Dakin's solution. The antiseptic should be used until all microbes have disappeared from the wound. This means about forty-eight hours for a surface wound, and generally from six to ten days for other wounds. It means also that bacteriological examinations of the wound should be made every two or three days, because clinical appearances of the wound alone do not show at what time complete sterilization has taken place. When both clinical and bacteriological examinations of the wound show that it is sterile, its edges are brought together by adhesive plaster or stitches, and union takes place in a few days.

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The method is not complicated, but it is impossible to learn the procedures in a few hours. About three weeks are required for an experienced surgeon to learn how to sterilize a wound. When the surgeon applies, exactly, the technique, sterilization results rapidly, especially if it is freely opened and treated during the first twenty-four hours. If the patient be treated when the wound has begun to suppurate, disappearance of the pus takes place rapidly—after from two to four days generally—and the sterilization can be obtained and the wound ultimately sutured.

The saving of time and of money brought about by the complete sterilization of wounds is very striking. Of 136 wounds treated in my hospital in December, 1915, 121 were closed before the twelfth day. As the normal cicatrization of most of these wounds would have taken, by ordinary methods, from thirty to sixty, or even 100 days, it is easy to understand the saving of money which was effected. If we assume that every wounded man costs $2 per day, it will cost the country $180 if he stays ninety days in the hospital. If the wound is healed in twenty days, it represents a saving to the country of $140, and for 1,000 wounds, the saving is $140,000. In cases of fracture it is also possible to decrease in a large measure the length of treatment. It happens often that a badly infected fracture of the femur is still suppurating after 300 days. However, if we take the trouble to sterilize such a wound, we can close it after twenty days. A patient discharged after 100 days instead of after 300 days, means a saving of $400. Therefore, 100 fractures of the thigh treated in the proper way will save the country $40,000. Besides, the degree of permanent disability and the amount of pension paid to a man whose wound has not suppurated is very much less than when infection has required his remaining in a hospital for a year or more. When we consider that statistics based upon more than 50,000 amputations show that 70 per cent of these amputations are due to infection, we can readily see that 50 per cent of the amputations might be avoided by proper treatment.

Our experience has shown us that incalculable saving of life, limb and money can be made. What is needed to produce such a result is a proper organization, the component parts of which will be coördinated and elaborated as well as it is actually possible.

THE MEDICAL CORPS OF THE NAVY[1]

It is with pleasure that I respond to the request of the Secretary-Editor of THE MILITARY SURGEON, to review the article by Dr. Holcomb with the above title. In this article, Dr. Holcomb, in his capacity as

[1] *The Navy Needs More Medical Officers*, by R. C. Holcomb, Surgeon, U. S. Navy. *N.Y. Med. Jour.* Vol. cv, No. 11, March 17, 1917, p. 481.

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assistant to the Chief of the Bureau of Medicine and Surgery of the Navy Department, makes a strong and very serious appeal to the medical men of the country to join the Navy, thereby assisting him in his attempt at filling the large number of vacancies, now existing in the Medical Corps of that service, but recently very much increased in numbers by an act of Congress. The article is, in reality, a very worthy supplement to a pamphlet published by the Surgeon General of the Navy, some weeks since, with the same end in view.

It appears that there are now 300 vacancies in the Medical Corps of the Navy to be filled. Dr. Holcomb cites some of the attractive features of the service, such as increased pay and rank. The writer feels sure, however, that there are higher and, perhaps, more ideal inducements about the Naval Medical Service to appeal from, and more worthy potential attributes in our American medical men to appeal to, than mere rank and emolument: The Navy is the pride of the people of the land; military men regard it as the first line of defense in a foreign war; the Naval Medical Service performs first-aid service behind the line of battleships and cruisers: A more important and humane service in time of war can hardly be imagined! Is there nothing in all this that appeals to the thousands of young medical graduates in this, our country, much more than rank and pay can do?

It may be a pardonable offense, if done unostentatiously, in times of peace, for young men to consult the pay table before entering a service like that in the Navy, but in these present times of stress, necessity and national needs, such considerations ought to be made subordinate to other more worthy considerations and a more profound duty-sense be made to prevail!

With regard to the requirement for admission, Dr. Holcomb tells us that the "physical examination is thorough and searching" and that the professional examination, while comprehensive, "should be within the limit of the attainment of any well-qualified physician." We may be permitted, tacitly, to assume and add, that both examinations are conducted on the highest principles of justice to all and impartially, without regard to personal considerations. Unfortunately, there exists at present no method of examination for determining and standardizing that prime moral force in a candidate, that finds expression in a *truly* patriotic devotion to the performance of the duties of the service and that, nevertheless, ought to constitute a most important factor in the examination.

With regard to the physical examination of physicians, prior to their entry into the service, it has always seemed to the writer and, perhaps to some of the candidates, as questioning the truthfulness of a medical

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aspirant. Any candidate, knowing beforehand that none but perfect physical specimens need apply for admission, his four years of medical training afford him the best of opportunities for being made aware of all the imperfections inherent in his own person. Such an one presenting himself and being found unqualified physically, deserves, perhaps, to be dropped on moral grounds alone. On the other hand, we must admit that there are certain border-line deficiencies, the significance of which, in their relation to the service, an outsider cannot be supposed to appreciate or be familiar with, and which may be judged properly only by a board of experienced naval medical examiners. We are, therefore, not as yet quite prepared to spare a candidate this "searching" physical examination, mentioned in Holcomb's paper.

As regards the professional examination, the writer entirely agrees with Dr. Holcomb when he says that any well-qualified physician ought to be able to pass it; and, since every young medical student experiences the thrill of being well qualified at least once in his young life—on graduation only—we should recommend to him to apply early!

The examination at the present time is divided into two parts. The first part is for enrollment in the "Naval Reserve Force." If the candidate was successful in passing the first part of the examination and now wishes to join the permanent "Medical Corps of the Navy," he is required to attend a course of instruction given at the Naval Medical School at Washington, and upon completion of this course he takes the second or final part of the professional examination and, assuming him to be successful, he is then qualified to enter the Corps as an Assistant Surgeon.

A noteworthy institution, of recent date, is the "Naval Medical Reserve Force," the creation and elaboration of which, may, in all fairness, be attributed to the untiring and persistent efforts of the present Chief of the Bureau of Medicine and Surgery. The writer must refer the reader of these lines to the original paper of Dr. Holcomb for the necessary details given therein. This article is accompanied by seven very fine illustrations, well calculated to give a good impression of our Naval Hospitals and of the Naval Medical School. The reviewer, unable to dissociate his retired life from an intensive interest in the welfare of the Naval Medical Service, may be forgiven for urging his young colleagues to join the Corps, fill the existing vacancies as soon as possible, and bring the Corps up to the requirements of present national needs!

H. G. Beyer.

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THE MEDICAL RESERVE OF THE ARMY

The following circular was issued recently from the Surgeon General's office for the guidance of the new local examining boards, appointed from the officers of the Medical Reserve, U. S. Army. We are gratified to learn that recruiting is going on briskly for the Corps, under the stimulus afforded by the prospect of active service.

INFORMATION RELATING TO APPOINTMENTS IN THE MEDICAL OFFICERS' RESERVE CORPS OF THE ARMY

Under the new regulations for the examination of candidates for appointment in the Medical Officers' Reserve Corps of the Army, the candidate is required: First, *to submit his application in writing to the Surgeon General of the Army;* second, *the application should be accompanied by two testimonials;* and, third, the *personal history blank*, properly filled in as directed thereon, *after having the same certified to before a Notary Public.* (These blanks may be obtained from the Surgeon General, U. S. Army, Washington, D. C.)

The requirements for appointment are that the applicant must be a citizen of the United States, between 22 and 55 years of age, a graduate of a reputable medical school legally authorized to confer the degree of doctor of medicine, he must have qualified to practice medicine in the State in which he resides, and be in the active practice of his profession.

The examination is physical and professional; the professional examination to be oral, except in case of failure, when it will be written. Such written examination will be in the following subjects:

1. Practice of medicine, including etiology, clinical description, pathology, and treatment of diseases.
2. Surgery—principles and practice.
3. Obstetrics and gynecology.
4. Hygiene—personal and general, especially as to the prophylaxis of the more prevalent epidemic diseases.

Specialists will be examined in their specialty.

Commissions are issued for a period of five years, at the end of which time officers may be recommissioned in the same or higher grades, that is, first lieutenant, captain, and major.

The Act of June 3, 1916, creating the Medical Officers' Reserve Corps, provides that in time of peace only those of the grade of first lieutenant may be ordered to active duty, and this with their own consent, but in time of war the services of officers of all grades are at the disposal of the Government.

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PUBLISHED BY THE
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OF THE UNITED STATES
ARMY MEDICAL MUSEUM, WASHINGTON, D. C.

MAY, 1917

VOL. XL NUMBER 5

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The Military Surgeon

Published monthly and constituting two volumes annually.
Volumes commence with the January and July numbers.

Entered as second-class matter January 22, 1916, in the Postoffice at Washington, D. C., under the Act of March 3, 1879.

Subscriptions $3.50 a year for the United States. Elsewhere throughout the world, $4.00. Single copies 40 cents. Subscriptions payable in advance. Checks should be made payable to the Association of Military Surgeons and not to any officer personally.

The addresses of members and subscribers are not changed except upon request. In every case the old as well as the new address should be given. Requests for change of address must reach the Secretary before the twentieth of the month to be effective for the following issue.

Original articles, items of news and matter of interest to the Services are welcomed. Requests for reprints should be made at the time of forwarding articles.

EDITED BY

Lieut. Col. EDWARD L. MUNSON
Medical Corps, U. S. Army

Colonel JOHN VAN R. HOFF
Medical Corps, U. S. Army (Retired)

COLLABORATORS

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Commandant, Army Medical School

Medical Director EDWARD R. STITT, U. S. N.
Commandant, Naval Medical School

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U. S. P. H. S.
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Professor of Hygiene, United States Military Academy

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THE
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VOL. XL MAY, 1917 NUMBER 5

ORIGINAL ARTICLES

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CARREL'S METHOD OF WOUND STERILIZATION

BY COLONEL WILLIAM H. ARTHUR
Medical Corps, United States Army

(With two illustrations)

UNDOUBTEDLY the most valuable and important advance in the treatment of infected war wounds, that has grown out of the experience in the military hospitals of the contending armies in Europe, is the Carrel-Dakin method of wound sterilization, which has given such brilliant results in the French hospital at Compiègne, as carried out by Dr. Carrel himself, and in other hospitals where his directions have been faithfully and systematically followed.

The details of this method outlined in this brief paper are gathered from three sources—

First. The very interesting and exhaustive report sent in by one of our own observers, Maj. Clyde S. Ford, M. C., who has carefully watched and intelligently recorded the method and its results in Carrel's own experimental hospital at Compiègne.

Second. The account of his experiences in the same hospital given in an illustrated lecture before the class at the Army Medical School by Dr. Fred H. Albee of New York.

Third. A very interesting lecture also to the class at the Army Medical School by Dr. Carrel, himself.[1] In addition to hearing this lecture, I was fortunate enough to have two long interviews with Dr. Carrel, during which he very kindly answered many questions, cleared up many points, and gave me many minor details.

When the war began, and the wounded accumulated in the different hospitals, the French surgeons, as well as those of all other armies, were suddenly brought face to face with conditions outside of their experience; an enormous number of wounds primarily, deeply, and apparently hopelessly infected, not seen by the surgeon in most cases until days after the wounds had been inflicted, during which interval the infecting

[1] See THE MILITARY SURGEON, April, 1917.

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organisms had developed, grown and multiplied in the tissues, and produced disastrous results. The first-aid occlusive dressing, which may be of use in preventing further admission of bacteria to the wound, is worse than useless in cases primarily infected by the driving of foreign bodies (generally shreds of dirty clothing) into the wounds. This occlusive dressing under these conditions serves principally as a dam, preventing the escape of discharges from the tissues, keeping the infecting organisms in the wound and helping to spread the infection. The lacerated tissues of a gunshot wound with ragged masses of devitalized tissue, effused blood and lymph bathing it, offers an ideal culture medium for almost any pathological organism, and in this war, fought in large part on ground cultivated for centuries, the soil teeming with saprophytic and fecal bacteria loaded with the spores of tetanus gas bacillus, and other organisms, and the clothing of the soldiers becoming contaminated by this soil, it was not surprising to find all shell wounds and a vast majority of the wounds produced by rifle bullets, thoroughly infected; and many methods were devised, tried and abandoned in the effort to combat this almost universal infection. At first the English surgeons fell back on their old favorite—Phenol, full strength—swabbing out deep wounds with pure carbolic acid, and washing with alcohol. The results were not good. Then Sir Almroth Wright introduced his method of "lymph lavage," as he called it, using a hypertonic (5 per cent) salt solution in large quantity, with a view of encouraging the flow of lymph toward the surface of the wound, carrying with it the infecting organisms and the products of their destructive activity. The theory did not work out in practice. The solution was found irritating to the tissues, and the outflow of lymph was not sufficiently copious or rapid to produce the desired result. I believe it is still being tried in some of the English hospitals. Of course the old surgical principle of opening and draining at the first opportunity, removal of all foreign matter, trimming out devitalized tissue, cleaning up the wounds, was carried out, and must be to secure good results with any method of wound treatment.

No method gave really good results, and in the first year of the war the deaths from general septicemia became so frequent that to head it off many limbs were sacrificed, many amputations done that can now be avoided, and the process of wound healing has been reduced from months to weeks, or even days, by the method devised by Dr. Carrel. Some of the statistics in the matter of amputations in the French hospitals before and after the adoption of this method are illuminating. Septicemia and its fatal results were so common early in the war that amputation for gunshot fracture of femur, knee joint, or tibia, was

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the routine practice. It was a reversion to the practice of the Crimean and civil wars, a surgical set-back of fifty years.

Dr. Carrel, with his usual thoroughness, care and intelligence, guided, too, by his great experience as a "laboratory surgeon," studied the whole subject.

His problem was to find a non-irritating bactericide that can, without injury to the healthy tissues, be kept in close contact *for a long time* with every nook and cranny of an infected wound. Would not such an antiseptic be able to destroy every pathological organism lurking in such a wound?

What chemical bactericide can be found possessing the following qualifications?

First. It must have antiseptic power; must destroy pathological organisms, not only in vitro, but under the much more difficult conditions found in a lacerated wound.

Second. It must be perfectly harmless to normal tissue.

Third. It must be painless, non-irritating.

Fourth. It must be cheaply manufactured, chemically stable, easily carried, and always obtainable.

A well-known chemist, Dakin, was called in to find an antiseptic with all these desiderata. After many experiments he settled on an old combination that depends on chlorine for its antiseptic value. It is very similar to Javel water, or Labarraque's solution; is made from bleaching powder and in essence consists of a dilute solution of sodium hypochlorite carefully neutralized, for, if alkaline, it is irritating to the tissues. This solution, to be effective, must be at least .45 of 1 per cent. To be non-irritating it should be not more than .5 of 1 per cent, and even at that strength it is necessary to keep the skin about the wound well smeared with yellow vaseline, or it will, after long maceration, become irritated. One of the principal desiderata—cheapness—this solution was found to meet better than many others that were tried, which, but for their cost, might have answered equally well.

But the selection of an antiseptic was only one factor in the solution of the problem, and Dr. Carrel, himself, insists that the way in which it is used is essential to its efficiency, and that no good results can be expected unless his directions are carefully followed.

One of the most important factors in this method is the time necessary for the antiseptic to remain in contact with the organisms, in order to destroy them. The rapid washing out of a wound with the strongest antiseptic known, keeping the agent in contact with the infected area for a few moments only, according to Carrel, produces little or no effect. To destroy the organisms it is necessary to expose

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them to the action of the bactericide for long periods—hours, even days—and the antiseptic solution must be constantly renewed, as it rapidly loses its bactericidal power. Every part of the wound must be constantly washed in the antiseptic if any efficient sterilization is to be hoped for. The carrying of the antiseptic solution into every nook and cranny of the wound, so as to have no part of it covered in and out of reach of the bactericide, protected from its action by bridges of tissue, coagulated blood, or anything else, is absolutely necessary.

The three factors in wound sterilization, then, are:

First. An efficient, non-irritating bactericide.

Second. Time given for it to produce its effect on the pathogenic organisms.

Third. The carrying of it into every part of the lacerated area—every nook and cranny of the wound.

Dakin having found a good chemical bactericide, a neutral solution of .45 to .5 of 1 per cent sodium hypochlorite, the next question was to devise a method for bringing it into contact with all parts of the wound, keeping it there, constantly renewed at short intervals, as its bactericidal power becomes exhausted, or it evaporates, and all this must be done with as little disturbance as possible to the patient, with as few dressings and re-dressings as possible.

First, the wound must be fully opened and thoroughly cleaned out; all foreign bodies removed, all devitalized tissue trimmed, curetted and washed away; all sinuous tracks and all pockets opened up, and the wound made, as nearly as possible, a large simple cavity. This often cannot be done without destroying too much healthy tissue, but as far as possible everything must be done to prevent any mechanical interference with the access of the antiseptic fluid to any part of the wound. All bleeding should be carefully checked, for coagulated blood makes both a good culture medium and an excellent shelter for bacteria, and will protect them from the action of the bactericide.

To enable the fluid to reach all parts of the wound, numerous small rubber tubes are inserted deeply into every corner of it, the number depending, of course, on the size of the wound and the number of the tracks and pockets connected with it. These tubes are of soft rubber, small, closed at the distal end, but furnished with numerous small holes near that end, and, after they are carried as deeply as possible into all parts of the wound, gauze is lightly packed around them, and kept constantly saturated with the fluid escaping from the tubes. For long sinuous tracks the tubes are wrapped in several layers of gauze before being introduced.

The apparatus for conveying the Dakin's fluid to the tubes in the

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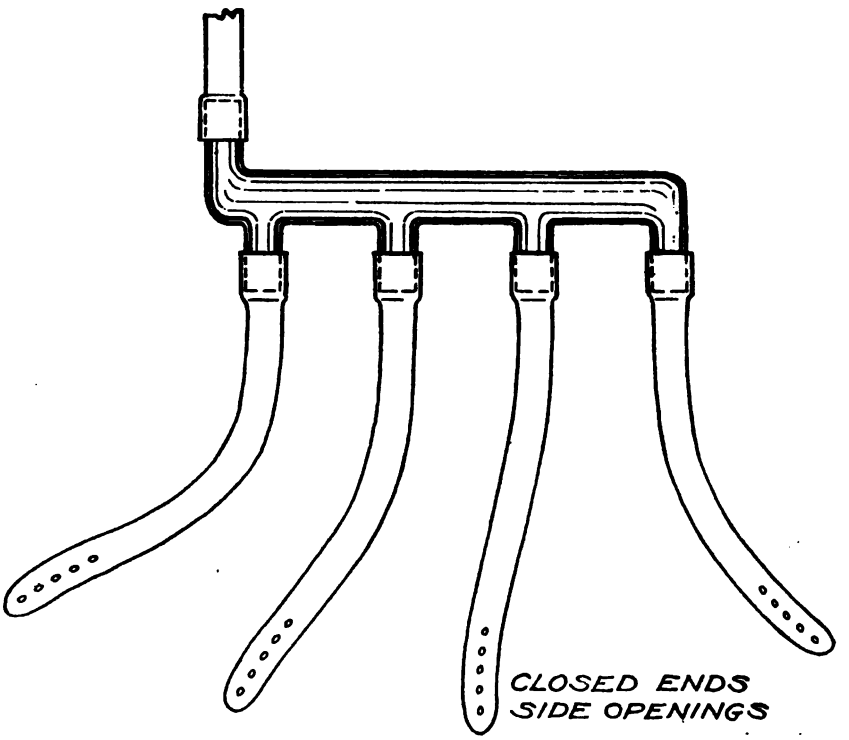
wound is very simple. A large container (Carrel used a large glass ampoule, but any irrigating apparatus will answer) is suspended 1 meter above the level of the wound. From it leads a rubber tube, furnished with a pinch-cock. This tube ends in a glass manifold with four outlets to each one of which is attached one of the small tubes carried deeply into the wound. A "Y" tube may be inserted in the course of the large feed-tube from the container to each branch of



DETAIL OF MANIFOLD

which a four-ply manifold can be attached, thus furnishing eight tubes to be carried into the wound. Dr. Carrel says in very complicated thigh wounds he has used as many as twelve irrigating tubes, all connected with one irrigator. Of course, two or more irrigators may be used if necessary.

After the tubes are inserted gauze is packed lightly around them, the irrigator connected, and the surgeon releases the pinch-cock and notes the exact time it take to saturate the gauze in the wound with the fluid (it is not allowed to overflow), and the skin about the wound

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is carefully anointed with ordinary yellow vaseline. The time it takes to saturate the packing is noted, and thereafter every two hours the nurse in charge of the case opens the pinch-cock just that length of time. In this way the gauze is kept saturated, the fluid renewed, with little disturbance of the patient.

The next improvement introduced by Dr. Carrel in this method of wound sterilization was his way of watching the progress of sterilization, determining at what time the disinfection was complete, and when it would be safe to remove all dressings and close the wound with perfect assurance of its prompt healing; when, that is to say, the wound might be considered clean, aseptic, sterile.

To determine this point (and he has brought it very close to perfection) he keeps a chart, very similar to a temperature chart, on which is described a *courbe microbienne*, or microbic curve, obtained in this way: Each alternate day from the most suspicious area of the wound is taken a smear, spread on five glass slides, stained by some simple method, and the bacteria (any kind of bacteria—no attempt is made to plate or differentiate them) counted, if they are not too numerous to count. Anything above an average of sixty organisms in the five slides indicates a thoroughly infected wound. With surprising rapidity, under this constant soaking of the wound, the bacteria diminish in number till they can be counted, and the number is indicated on the chart. As they diminish below sixty the line drops, till at last, when only one or two on an average are found in the five slides, and this persists for three days, the wound is considered sterile and may be safely closed. If at any time the curve takes a sudden upward turn, or fails to come down steadily, showing an increase or persistence of the number of bacteria to each field, it is assumed that some foreign body is concealed in the wound, and search is made for it.

When the wound has become sterile, as shown by this chart, for three days, the tubes and packing are removed and the wound closed, preferably by adhesive strips furnished with hooks and laces, or, if necessary, by sutures. Great losses of skin must be repaired later by skin grafting, though much has been accomplished by skin stretching, by lacing with rubber cord, over hooks fastened to adhesive strips, the constant gentle traction often enabling the skin to cover surprisingly large areas. Not only has the method of Dr. Carrel saved many limbs and rescued much tissue from destruction by infection, but it has enormously shortened the time necessary to secure final cicatrization of wounds. Often cases that under ordinary treatment would have taken six months to cicatrize have now completely healed in as many weeks.

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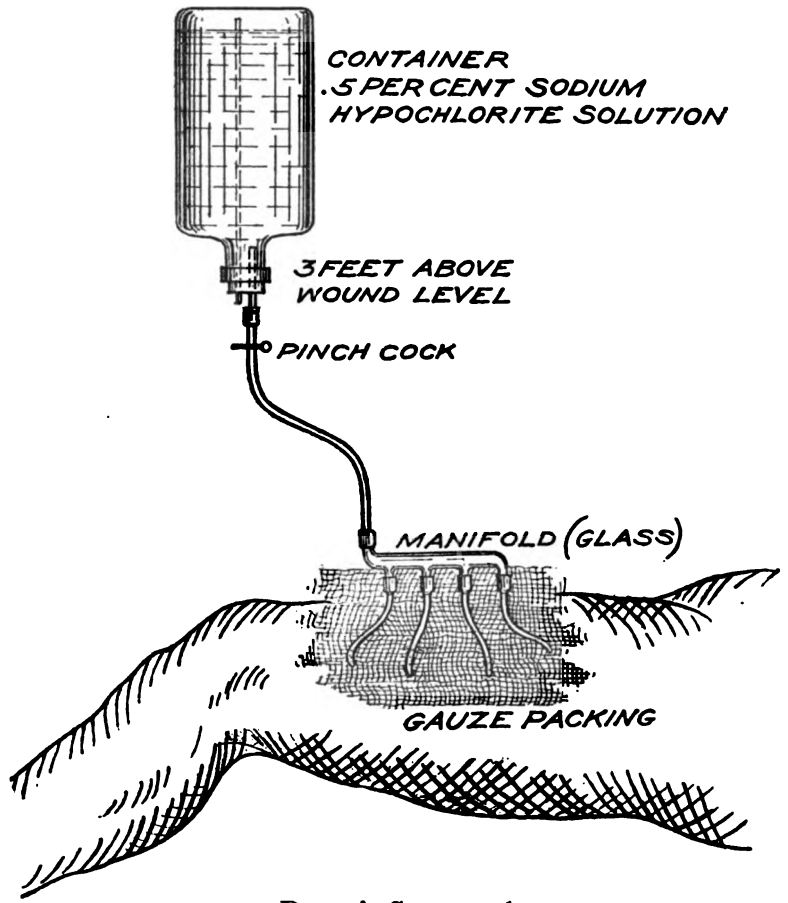
Great care must be exercised in making the Dakin fluid. If it is not carefully neutralized, it is irritating. Directions for making it are appended, as made in the chemical laboratory of the Army Medical School under the direction of Lieut. Col. C. R. Darnall, M. C., from the directions furnished in the report from the Carrel Hospital at Compiègne by Maj. Clyde S. Ford, M. C.



Dakin's Solution[1]

Preparation of Dakin's Solution (Daufresne's Technic):—Dakin's solution is a solution of sodium hypochlorite for surgical use, the characteristics of which, established from numerous tests and a long practical experience, are as follows:

(*a*) *Complete Absence of Caustic Alkali.*—The absolute necessity for

[1] *Jour. A. M. A.*, Dec. 9, 1916, p. 1777.

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employing in the treatment of wounds a solution free from alkali hydroxide excludes the commercial Javel water, Labbaraque's solution and all the solutions prepared by any other procedure than the following:

(*b*) *Concentration.*—The concentration of sodium hypochlorite must be exactly between 0.45 and 0.50 per cent; below 0.45 per cent of hypochlorite the solution is not sufficiently active; above 0.50 per cent it becomes irritating.

Chemicals Required for the Preparation.—Three chemical substances are indispensable to Dakin's solution: chlorinated lime, anhydrous sodium carbonate, and sodium bicarbonate. Among these three products, the latter two are of a practically adequate constancy, but this is not the case with the first. Its content in active chlorine (decoloring chlorine) varies within wide limits, and it is absolutely indispensable to titrate it before using it.

Titration of the Chlorinated Lime.—There must be on hand for this special purpose:

A 25 c.c. burette graduated in 0.1 c.c.

A pipette gauged for 10 c.c.

A decinormal solution of sodium thiosulphate (hyposulphite).

This decinormal solution of sodium thiosulphate can be obtained in the market; it can also be prepared by dissolving 25 gm. of pure crystalline sodium thiosulphate in 1 liter of distilled water, and verifying by the decoloration of an equal volume of the decinormal solution of iodine by this solution. The iodine is prepared by dissolving 1.27 gm. iodine and 5 gm. potassium iodide in 100 c.c. of water.

The material for the dosage thus provided, a sample of the provision of chlorinated lime on hand is taken up either with a special sound or in small quantities from the mass which then are carefully mixed.

Weigh out 20 gm. of this average sample, mix it as completely as possible with 1 liter of water, and leave it in contact for a few hours, agitating it from time to time; filter.

Measure exactly with the gauged pipette 10 c.c. of the clear fluid; add to it 20 c.c. of a 1:10 solution of potassium iodide and 2 c.c. of acetic or hydrochloric acid. Drop, a drop at a time, into this mixture a decinormal solution of sodium thiosulphate until decoloration is complete.

The number of cubic centimeters of the hypochlorite solution required for complete decoloration, multiplied by 1.775, gives the weight of the active chlorine contained in 100 gm. of the chlorinated lime.

This figure being known, it is applied to the accompanying table, which will give the quantities of chlorinated lime, of sodium carbonate,

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and of sodium bicarbonate which are to be employed to prepare 10 liters of Dakin's solution.

QUANTITIES FOR INGREDIENTS FOR 10 LITERS OF DAKIN'S SOLUTION

Titer of chlorinated lime	*Chlorinated lime, gm.*	*Anhydrous sodium carbonate, gm.*	*Sodium bicarbonate, gm.*
20	250	115	96
21	220	110	92
22	210	105	88
23	200	100	84
24	192	96	80
25	184	92	76
26	177	89	72
27	170	85	70
28	164	82	68
29	159	80	66
30	154	77	64
31	148	74	62
32	144	72	60
33	140	70	59
34	135	68	57
35	132	66	55
36	128	64	53
37	124	62	52

Example.—If it required 16.6 c.c. of the decinormal solution of the sodium thiosulphate for complete decoloration, the titer of the chlorinated lime in active chlorine is:

$$16.6 \times 1.775 = 29.7 \text{ per cent.}$$

The quantities to be employed in this case to prepare 10 liters will be:

Chlorinated lime.....154 gm.
Dry sodium carbonate..... 77 gm.
Sodium bicarbonate..... 64 gm.

If crystalline sodium carbonate be employed, then instead of the 80 gm. of dry carbonate it must be replaced by:

Crystalline sodium carbonate.....220 gm.

Preparation of Dakin's Solution—to 10 liters:

1. Weigh exactly the quantities of chlorinated lime, sodium carbonate, and sodium bicarbonate which have been determined in the course of the preceding trial.

2. Place in a 12 liter jar the chlorinated lime and 5 liters of ordinary water, agitate vigorously for a few minutes, and leave in contact from six to twelve hours; over night, for instance.

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3. At the same time dissolve, cold, in the other 5 liters of water the sodium carbonate and the bicarbonate.

4. Pour all at once the solution of the sodium salts into the jar containing the maceration of chlorinated lime, agitate vigorously for a few moments, and leave it quiet to permit the calcium carbonate to settle as it forms. At the end of half hour, siphon the liquid and filter it through double paper to obtain an entirely limpid product, which must be protected from light. Light, in fact, alters quite rapidly solutions of hypochlorite, and it is indispensable to protect from its action the solutions which are to be preserved. The best way to realize these conditions is to keep the finished fluid in large wicker covered demijohns of black glass.

Titration of Dakin's Solution.—It is a wise precaution to verify, from time to time, the titer of the solution. This titration utilizes the same material and the same chemical substances as are used to determine the active chlorine in the chlorinated lime.

Measure out 10 c.c. of the solution, add 20 c.c. of a 1:10 solution of potassium iodide, and 2 c.c. of acetic acid, or hydrochloric acid. Drop, a drop at a time, into this solution a decinormal solution of sodium thiosulphate until decoloration is complete.

The number of cubic centimeters employed multiplied by 0.03725 will give the weight of the sodium hypochlorite contained in 100 c.c. of the solution.

A solution is correct when, under the conditions given above, from 12 to 13 c.c. of decinormal thiosulphate are required to complete the decoloration.

$$13 \times 0.03725 = 0.485 \text{ per cent of NaOCl.}$$

Test for Alkalinity of Dakin's Solution.—It is easy to differentiate the solution obtained by this procedure from the commercial hypochlorites and from Labbaraque's solution.

Pour into a glass about 20 c.c. of the fluid, and drop on the surface a few centigrams of phenolphthalein in powder form. Dakin's solution, correctly prepared, gives absolutely no change in tint, while in the same conditions Javel water and Labbaraque's fluid give an intense red coloration which indicates in the latter two solutions the presence of free caustic sodium.

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RECENT DEVELOPMENTS IN CAMP SANITATION

By Lieut. Col. W. F. LEWIS, Medical Corps, U. S. Army
Sanitary Inspector, El Paso District
AND
Major R. B. MILLER, Medical Corps, U. S. Army
General Sanitary Inspector, District of El Paso and New Mexico

(With twelve illustrations)

IN this article no attempt will be made to give a complete résumé of the subject of camp sanitation but rather to discuss a few new developments which have resulted from our recent experiences in the camps on the Mexican Border.

KITCHENS AND MESS HALLS

The standard type of kitchen and mess hall has proven satisfactory. In the construction of kitchen and mess tables certain changes have been found necessary, in order that exposed cracks between boards may be more readily cleaned. To accomplish this, kitchen table tops should be made of 2 by 6-inch stuff, five boards wide, cracks close, second and fourth boards left unnailed. By lifting the loose boards all exposed surfaces may be scrubbed without trouble. The tops of mess tables should be made of 1 by 12-inch material, two boards wide, with an interval of 1 inch between boards. On no account should kitchen or mess tables be constructed of tongued and grooved lumber.

ICE BOXES

In our Army, ice boxes are not regularly provided for troops in the field although the garrison ration cannot be economically used without the use of ice. In the El Paso District an ice box of extemporized pattern was finally authorized and the material for its construction delivered to each organization. These boxes were very poorly insulated, made no provision for separating the ice from the food, were badly drained and difficult to keep clean. There is urgent need for an ice box suitable for field use. When one has been devised it should be included in Equipment "B" and issued as a matter of routine when troops occupy permanent or semi-permanent camps.

When ice boxes were first installed in our camps the practice was to drain them into pits or ditches. During hot weather these pits become foul, pollute the ground and breed flies. All such pits and ditches were therefore prohibited and ice boxes are now required to be blocked up sufficiently to permit the waste water to be collected in buckets or

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other receptacles. If the collected water is reasonably clean it may be scattered in the sun.

DELIVERY OF FRESH MEAT

The consumption of fresh meat by the troops in the El Paso District averaged about 15 tons per day. It was obtained directly from the local storehouse of Armour and Company. For some months delivery was made by requiring each organization to send its own transportation to the storehouse daily. The result was not at all satisfactory as the wagons and paulins were frequently in a very insanitary condition. A medical officer was then stationed at the storehouse with instructions to refuse the delivery of meat to all organizations that failed to send clean paulins or other covering for its proper protection. This arrangement met the sanitary requirements very well but there still resulted a tremendous waste of transportation, as there were about one hundred trucks or wagons reporting daily at the storehouse, each one of which made a round trip of from 3 to 20 miles.

To meet this situation Maj. Willard F. Truby, M. C., U. S. A., who had charge of meat deliveries, devised the truck illustrated in Fig. 1. The details of construction were worked out by Captain Furlow of the Quartermaster Corps. This truck has a capacity for fifty-six quarters of beef which are carried suspended from hooks on an overhead frame. In actual use the contents of the truck are protected from dust by a tightly fitting canvas cover. During the fly season the truck will be screened. The vehicle here illustrated has given excellent satisfaction. The framework, however, is made of wood, is detachable from the truck by the removal of four bolts, and, although substantial in construction, occupies more inside space than is desirable. A second truck is planned in which the framework will be of steel.

The organizations supplied by the truck now telephone their meat orders to the storehouse every afternoon and the truck makes delivery at each organization kitchen on the following day. The meat is weighed and tagged by the contractors before it leaves their storehouse.

KITCHEN INCINERATORS

There is little uniformity of opinion as to the best type of kitchen incinerator, which is very good evidence that an entirely satisfactory one has not been developed. For the first few weeks the camps were in operation improvised rock incinerators were used. These were of many different patterns but all of them bore more or less resemblance to the incinerorat described in the Field Service Regulations of 1910. After things got settled down a bit the Quartermaster Corps furnished

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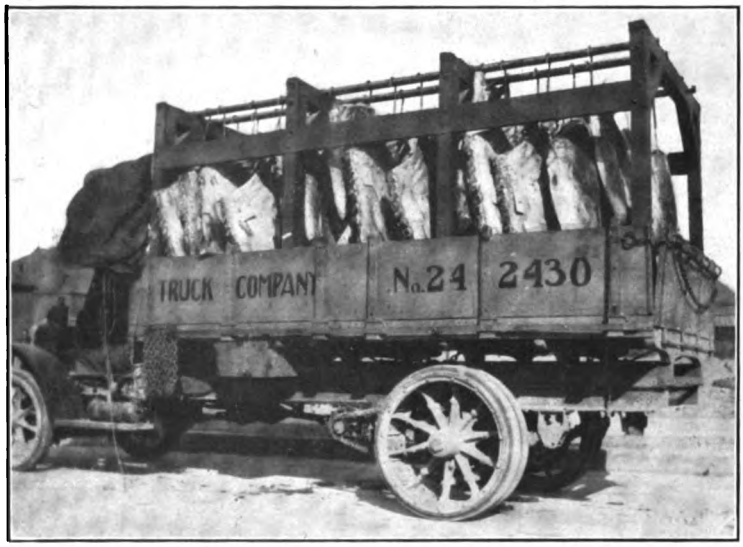

FIG. 1.—MEAT WAGON.
In actual use the framework is enclosed in a tightly fitting canvas cover.

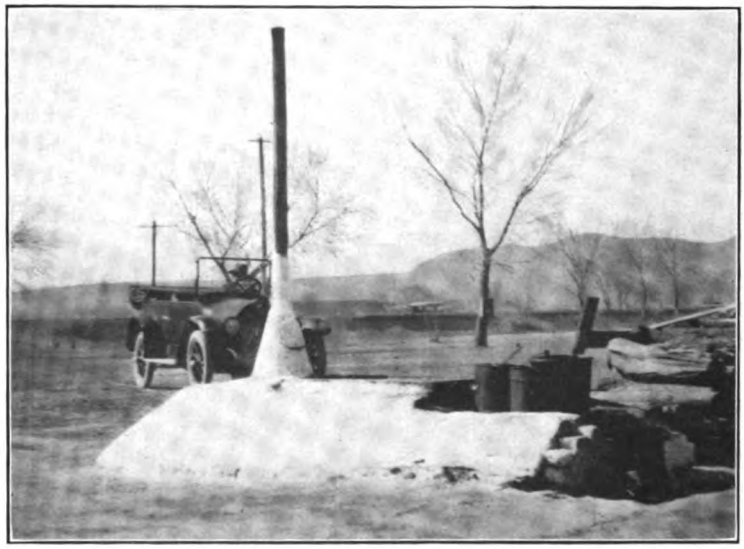

FIG. 2.—THE GUTHRIE INCINERATOR.

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the material for the construction of Guthrie incinerators (Fig. 2). These were placed in all camps except those of the Pennsylvania Division and the Seventeenth U. S. Cavalry. In the former camp the incinerator shown in Fig. 3 was used, and in the camp of the Seventeenth Cavalry

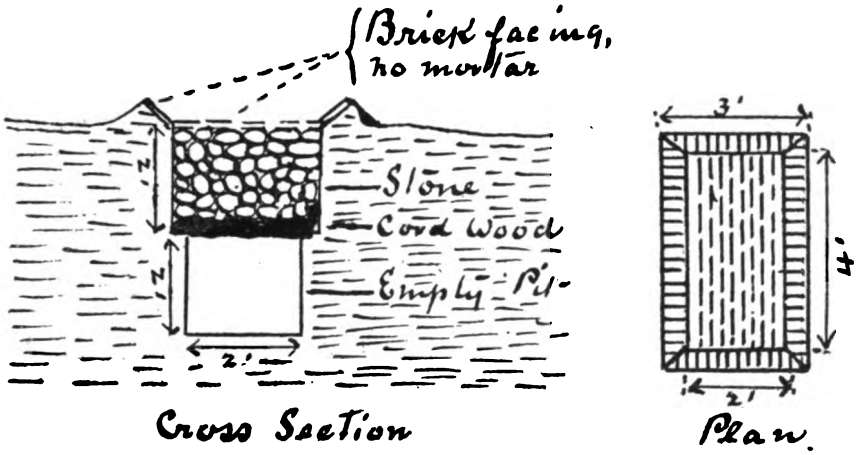

FIG. 3.—KITCHEN INCINERATOR.

the Charles incinerator, or some modification of it, was adopted. The Charles incinerator is too difficult to construct to be adaptable for routine use. The advantages and disadvantages of the other three types may be summed up as follows:

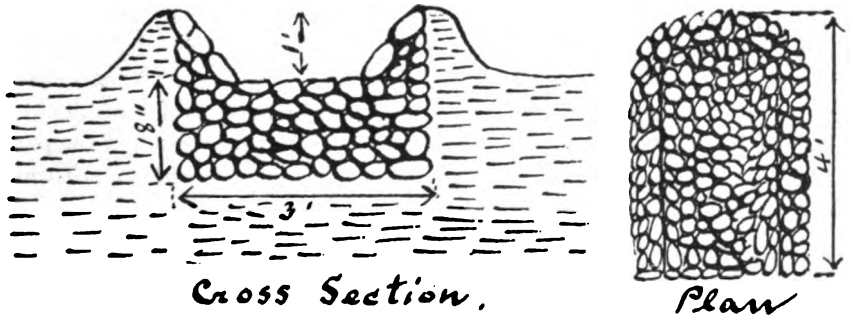

FIG. 4.—ROCK PIT KITCHEN INCINERATOR.
This incinerator is not essentially different from the type in use in the U. S. Army for several years.

1. Rock pit incinerator (Fig. 4). Advantages: (*a*) Where stone is available the construction is simple, quickly carried out and inexpensive. (*b*) Its use in mobilization and concentration camps trains the troops in a method which will probably be available for such use under all conditions of service. Disadvantages: (*a*) Requires a very considerable

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amount of time and patience in its operation, as the liquid must be added to it in small quantities at a time. (*b*) The interstices between the stones soon become clogged with ashes necessitating the reconstruction of the incinerator. (*c*) Owing to the time and trouble involved in adding the liquid garbage, there is great temptation for the cooks and kitchen police to dispose of dish water by throwing it in the company street, or in some other unauthorized place. (*d*) If the sides of the incinerator are banked up with earth which is not thoroughly packed and hard, they afford an exceptionally favorable breeding ground for flies. (*e*) When this type of incinerator is unused for a period of more than ten days, as may happen when the company goes on outpost duty or to the target range, flies may breed in the pit itself.

2. Modified pit incinerator (Fig. 3). Advantages: (*a*) Comparatively inexpensive. (*b*) The closely set brick surface prevents clogging with ashes, which permits longer use without reconstruction than is the case with the Field Service Regulations type. Disadvantages: (*a*) Brick are not available under all conditions of service. (*b*) The element of training is not so well carried out as with the Field Service Regulations type. (*c*) The liquid in the lower pit is not evaporated but remains in the pit in a putrifying condition.

3. The Guthrie incinerator (Fig. 2). Advantages: (*a*) With the occasional renewal of the evaporating pan the same incinerator may be used indefinitely. (*b*) The liquid may be added in considerable quantity at a time, which does away with the temptation to dispose of liquid garbage surreptitiously. Disadvantages: The material for its construction costs in the neighborhood of $20. (*b*) The experience gained in its operation is of little value in the training of troops for active service. (*c*) If the evaporating pan is not thoroughly scraped and cleaned every day a thick crust soon forms on the bottom of the pan, which results in a largely increased consumption of wood and in the destruction of the pan. (*d*) The draft is not sufficient, but this may be corrected by substituting a 6-inch tile pipe for Sibley stove.

It has been the writer's observation that any of these incinerators will dispose of the liquid and solid garbage of an organization provided they are intelligently managed. They are, however, expensive to operate where wood costs as much as it does on the Mexican border. For batteries of artillery and other large organizations the allowance of wood, as given in Equipment Tables, Quartermaster Supplies, is insufficient. In the El Paso district an increase of 1/12 cord per day for each incinerator was recommended and authorized. *In our opinion the rock pit incinerator* is the incinerator of choice for all camps not provided with sewer connection. Economy of construction and the

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training derived from its use are of so much importance that they outweigh the disadvantages referred to above. We believe, however, that as much as possible of the garbage of an organization should be consumed by the same fire that is used in the preparation of the food. To accomplish this purpose we recommend that a pit, a little larger than the fire box, 1 foot to 18 inches deep and filled with stones not less than 4 inches in diameter, be provided under each field range. The liquid is preferably added by pouring it through an improvised funnel attached to a tube which terminates at the bottom of the pit. This tube may be constructed of one or two joints of stove pipe or from tin cans. Care should of course be taken to prevent flooding the fire. Solid garbage should only be added when the range is not in active use for other purposes. If carefully managed and kept free from ashes this pit will consume the greater portion of the kitchen waste, making it necessary to use the outside incinerator for only a short time each day, possibly only when the use of some particular article of food makes an extra amount of waste.

If the Guthrie type of incinerator is used, it is especially important that an overflow hole in the end of the pan be provided as shown in the accompanying illustration. This was not done in the incinerators furnished in this district with the result that the pans were continually boiling over and polluting the ground in their immediate vicinity. The cross bars in front of the pan on the new model Guthrie incinerator are evidently intended to provide a place to boil water for washing mess tins. By lacing them with baled hay wire, they may be used as a grate upon which to dry solid garbage preparatory to placing it on the fire. In our opinion this is the best use to which these bars may be put.

DISPOSAL OF WASTE WATER AT SPIGOTS

To dispose of waste water in the vicinity of water spigots it has been a common practice heretofore to provide stone filled pits or open ditches. These pits and ditches, whether open or filled with stone, are a constant invitation to soldiers to use them for the disposal of waste food from their mess tins, polluted wash water, etc. If their existence is permitted they will invariably be found foul within a very short time and they are very difficult to inspect, as it is necessary to remove the stones to be sure of the underlying conditions. For these reasons the construction of all pits and ditches has been prohibited in this district, except for the disposal of bath water, the construction of incinerators and the removal of storm water. We require the ground around water risers to be mounded up, firmly packed and kept as dry as possible. A half barrel or other vessel is placed under the spigot, or a single flat stone may be

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so placed as to prevent the inevitable drip following each use of the spigot from making a hole in the earth mound. The clean water which collects in the tubs is scattered in the sun. Washing hands, cleaning teeth, and rinsing utensils under the spigots is prohibited.

DISPOSAL OF WASH WATER

The limited amount of waste water which results from the men washing their hands and faces may be safely disposed of by scattering it in the sun. The scattering must be well done and the water not thrown in pools.

The waste water from the washing of clothing offers a more difficult problem. If water is plentiful and the facilities for drainage from the bath houses are ample, the bath houses may very well be constructed so as to provide a place for washing clothes. This method proved very satisfactory at Columbus. Under the usual conditions prevailing in camp, however, movable benches or tables should be provided for the purpose. These benches should be placed in the rear of each company street and should be moved to a new spot every two or three days. Under no circumstances should they be placed where they will be shaded by buildings or trees. With the conditions of soil and climate prevailing in this district the above method has proven satisfactory as the sunlight and evaporation have been sufficiently active to prevent serious pollution of the soil. Stationary wash benches draining into pits have been prohibited.

BATH HOUSES

The camps on the border were established during the warm season and the bath houses constructed were in the nature of open sheds, with fourteen shower heads for the enlisted men of each regiment. With the advent of cold weather these bath houses had to be reconstructed and provided with apparatus for heating the water. For the latter purpose standard type heaters were first contemplated but it was found that they were not to be obtained, of sufficient size and capacity, in the United States, nor could they be manufactured within a reasonable time. If they could have been procured, the cost of their installation would have been in the neighborhood of $450 per regiment. Major Saville, of the Quartermaster Corps, proved equal to the emergency by devising the apparatus shown in Figures 5 and 7. The cost of this heater, including labor, was about $35 for each unit or $70 per regiment. It was easily installed and has proven entirely satisfactory. Freezing of the system can be prevented by draining it through a cock provided for that purpose but if, through neglect, freezing should occur and, especially, if it extends into water main, great care should be taken in starting the next

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FIG. 5.—THE SAVILLE BATH WATER HEATER. THE FIRE BOX AND WATER TANK ARE ENCLOSED IN ADOBE TO PREVENT LOSS OF HEAT. IN THIS ILLUSTRATION THE MOUND IS COVERED WITH WHITEWASHED STONES.

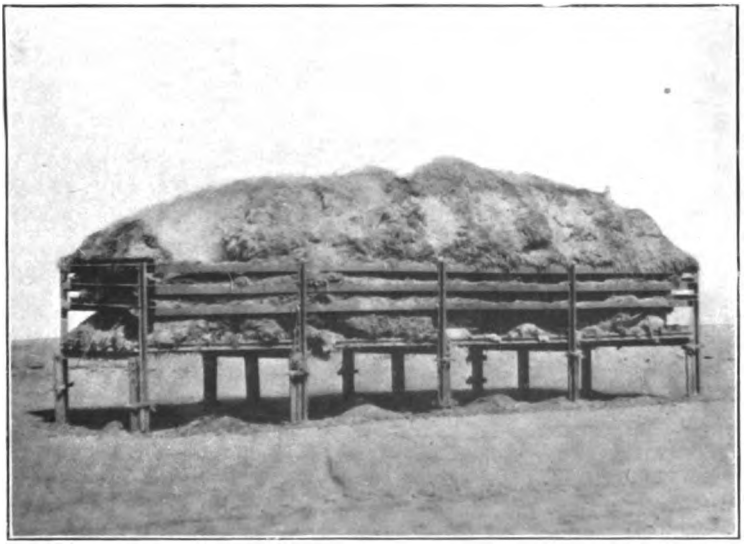

FIG. 6. —RAILROAD IRON INCINERATOR.
This incinerator was partly burned out when the photograph was taken. Ordinarily the manure is piled higher than here illustrated.

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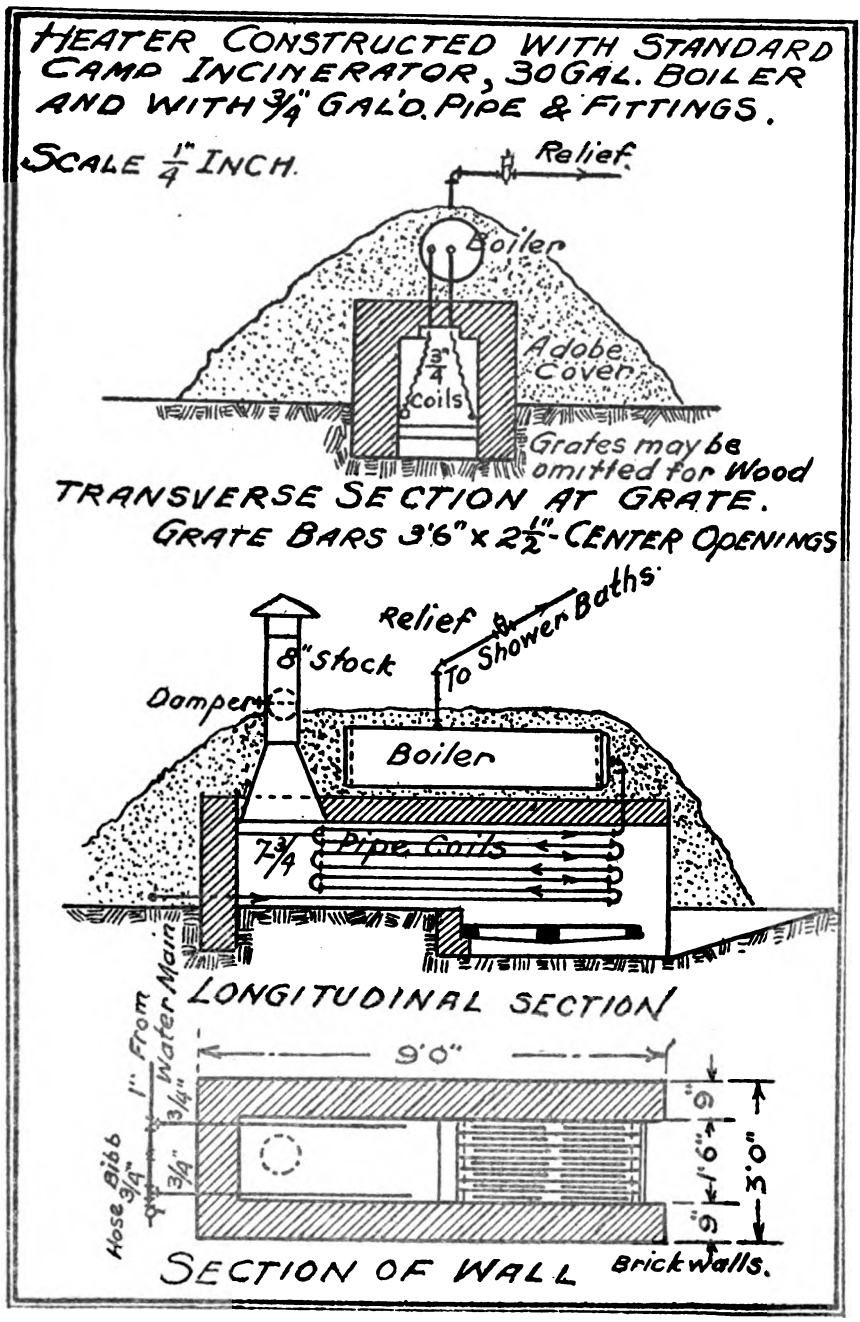

FIG. 7.—SAVILLE WATER HEATER.

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fire or a dangerous explosion may result. No special provision for heating the bath houses was found necessary in this district, the water pipes proving sufficient for this purpose even in the coldest weather.

Most of the bath-house structures were built too close to the ground. They should be sufficiently elevated to permit of thorough policing of the ground underneath.

The disposal of bath-house drainage has presented great difficulties. When directed into radiating ditches the effluent will breed mosquitoes unless it is kept constantly covered with oil, which condition is difficult to obtain. In the camps here we have had the best results by collecting the water in large pits, some of which were 15 feet in diameter and 20 feet deep. When necessary these pits have been pumped out with odorless excavators, but where they were deep enough to reach a substratum of sand pumping has not been required until the sides and bottom of the pit became impregnated with soap and grease. This usually required several weeks. It may be remedied by thoroughly cleaning the pit and removing about 6 inches of soil from all exposed surfaces.

FLIES

In the dry climate of West Texas, New Mexico and Arizona, flies do not breed in unsheltered places except during the rainy season, which is usually a very short one. The fly ova, however, appear to retain their vitality during the dry weather and with the advent of the rains the adult flies appear in enormous numbers. In the matter of fly prevention nothing particularly new has been developed except in the care of the latrines, which will be discussed later. In some instances, we have found countless thousands of larvae in the loose soil used to bank up the sides of kitchen incinerators. If these banks of earth are not thoroughly packed and hard they become impregnated with organic matter which, together with the warmth of the incinerator, makes the conditions ideal for fly breeding. Roofed horse stalls should also be closely watched as they will breed flies during the driest weather. The fly trap and the fly swatter are still our best remedies against the adult fly. Unfortunately neither of them are automatic in their action. A plan of Major Reno's is, shortly before each meal, to turn the whole company into the kitchen and mess hall with fly swatters. The men understand that no food will be served until all flies are disposed of. This adds a personal touch to the operation which is quite effective. Improvised swatters are readily made from wire screening and there is no reason why each organization should not have a large number of them constantly on hand. When the kitchens are being screened all scraps of wire should be saved for this purpose.

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LATRINES

In the construction of latrine boxes and urinal troughs the plans used in the Texas City camp have been quite closely adhered to in the El Paso district. In Columbus, where the sanitation was under the supervision of Major Hopwood, M. C., a different type of box was used and Guthrie incinerator cans were used for urinals, as shown in the accompanying drawings (Figs. 8 and 9) for which we are indebted to Major Hopwood. This plan proved very satisfactory and there is much to recommend it. The square boxes afford equal accommodation with the use of less material and they are stronger and stand transportation better than the long box of standard type. Urinal troughs are expensive and have to be made to order after camp is established, consequently there is always considerable delay in obtaining them; the

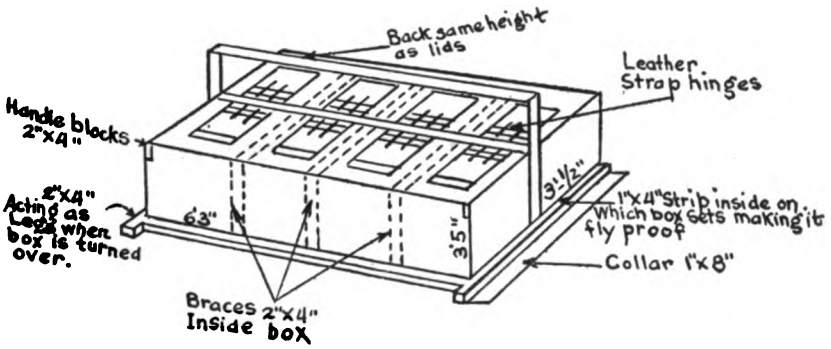
Back same height as lids
Leather Strap hinges
Handle blocks 2"x4"
2"x4" Acting as Legs when box is turned over.
63"
35"
3½"
1"x4" Strip inside on which box sets making it fly proof
Collar 1"x8"
Braces 2"x4" Inside box

FIG. 8.—LATRINE BOX USED IN THE CAMPS AT COLUMBUS.

spouts are frequently broken and the connection between the urinal and the latrine box is seldom made in a satisfactory manner. The can is a stock article, easily procured, costs less than the urinal trough, offers no difficulty when the latrine is moved to a new site, and it answers every requirement. When the latrine seat is removed for oiling the pit, the urine can is emptied and then burned out with a small amount of crude oil. Not more than half a pint of oil should be used or the can will be injured by the excessive heat. After burning out the can another half pint of oil is added and left to form a protecting film over the urine subsequently deposited.

In the El Paso district the practice of burning out latrine pits has been entirely discontinued. The routine now carried out is as follows: When the latrine is first established the inside of the box and the sides of the pit are thoroughly blackened with a mixture of 1 pound of bone black in 3 gallons of crude oil. For this purpose a spray pump (F. E.

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Myers & Bro., Ashland, Ohio, Catalogue No. 319, Figure 1410) is issued to each regiment. This application to the sides of the pit and to the inside of the latrine box is repeated once in ten days. In addition to the above the contents of the pit are thoroughly covered each day with 1½ gallons of the boneblack-oil mixture, using an ordinary sprinkling pot for the purpose. With a reasonably tight box, flies will not enter a pit so treated. Provided the pit is not used as a receptacle for waste paper and other rubbish it will not be so quickly filled under this treatment as when burning is resorted to. Another advantage of this method of latrine management is that it is applicable to pits that are shored up with lumber to prevent caving and to those containing water either from seepage or flooding. Some experiments have been conducted to determine whether bone black is necessary in the oil used for the daily sprinkling. Definite conclusions have not been arrived at in regard to this point. The experiments will be continued with the advent of the next fly season.

In every enlisted men's latrine a water can with spigot, and one or more basins, should be provided as an essential part of latrine equipment. If towels and soap can be added so much the better. We are free to admit, however, that we have not succeeded in obtaining these ideal conditions in the camps under our supervision.

MANURE AND RUBBISH DUMP

Burning manure in windrows has been practiced here according the plan followed in Texas City. If this method is followed attention is again called to the fact that the interval between windrows should be sufficient to permit driving astride of the windrow while the one adjacent to it is being burned. The space between windrows should be kept cleaned to the ground surface.

A number of railroad-iron incinerators, after the Panama plan (Fig. 6) have also been tried out. In this climate, with its low rainfall and high winds, one of these incinerators will dispose of from 25 to 50 loads of manure daily, depending upon the amount of dirt and sand in the manure and the experience of the stokers. The rails forming the floor should be laid at right angles to the long axis of the incinerator and it is an advantage to have them parallel to the direction of the prevailing wind. The great advantage of this incinerator is that it destroys all fly larvae immediately after the manure reaches the dump, whereas by the windrow method portions of the manure may escape burning for several days, allowing time for the escape of larvae into the underlying soil. No oil or purchased fuel of any kind is used in these incinerators except during wet weather, but such waste lumber and boxes as may

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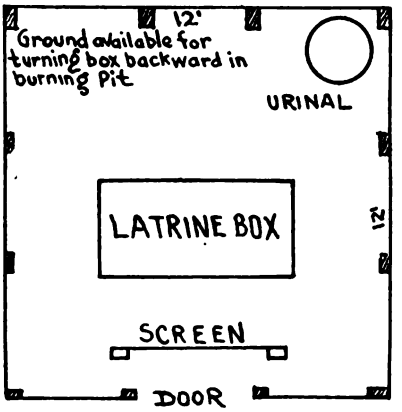

FIG. 9.—GROUND PLAN OF LATRINE BOX, LATRINE SCREEN AND URINAL CAN USED AT COLUMBUS, N. M.

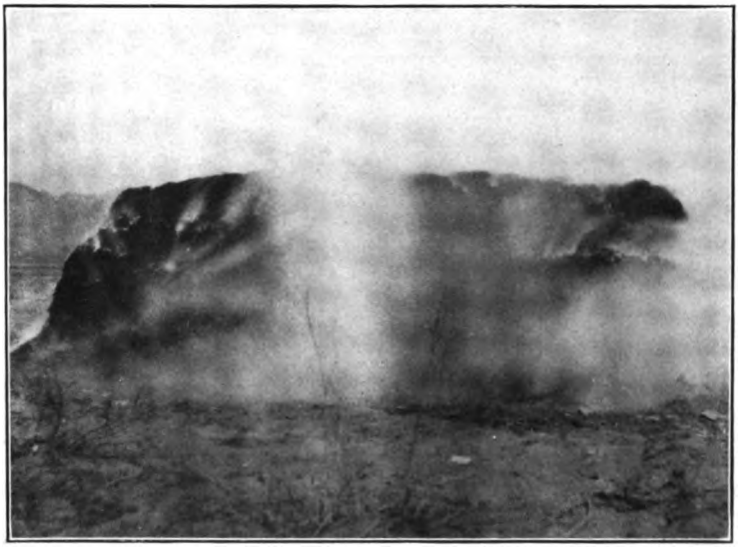

FIG. 10.—BURNING MANURE IN STACKS AS PRACTICED IN THE CAMPS OF THE PUNITIVE EXPEDITION.

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FIG. 11.—RUBBISH DUMP.
The only exposed rubbish is along the advancing margin of the pile.
The top of the dump is entirely covered over and smooth.

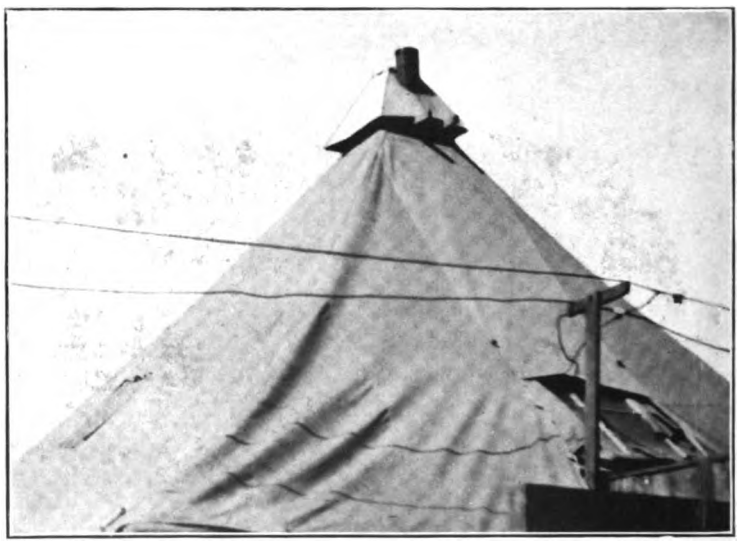

FIG. 12.—SHOWING THE ELEVATION OF THE METAL HOOD ON A PYRAMIDAL TENT. TWO TENT PINS ARE PLACED ACROSS THE IRON FRAME OF THE TENT TO SUPPORT THE HOOD AT THE PROPER ELEVATION. THE HOOD AND PINS ARE THEN WIRED DOWN.

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come to the adjacent rubbish dump are built into the stack as it is being made. For permanent camps and for posts where the manure is not used agriculturally, these incinerators are especially recommended.

Still another method of disposing of manure is recommended by officers returning from the camps of the punitive expedition. It consists in building from 25 to 30 loads of manure into a stack (Fig. 10) and burning it in place. If the manure is dry and contains a good deal of bedding these stacks will continue burning until entirely consumed. Less space is required for this method of disposal than is necessary when windrows are used. The plan has been tried out in this district and has not proven as satisfactory as the windrow method.

A tin can and rubbish dump is ordinarily a very unsightly place and has a tendency to spread over a great area. As organized by Major Bevans and more lately conducted by Major Truby, the dump at El Paso is kept within a very restricted area, is neat in appearance, does not breed flies and is sanitary in every respect. A general idea of its appearance and operation may be had from the accompanying photograph (Fig. 11). Tin cans, bottles, and such combustible material as is not disposed of on the manure incinerators, is dumped over the edge of the bank which is formed as the pile progresses. A fire is kept burning along the advancing edge of the pile and if the rubbish and tin cans are properly interspersed a sufficient draught will be obtained to completely consume all combustible material. The ashes from kitchen ranges and incinerators are deposited on top of the burned tin cans as the pile advances. It will be noted that this dump is compact, the tin cans are not left uncovered and the wagon animals are never required to pass over exposed bottles and other debris which might injure their feet. It should be understood that the entire elevation shown in the photograph is made up of incombustible rubbish; there is no natural rise of ground in the vicinity.

TENT HYGIENE

With the advent of cold weather, tightly closed tents, Sibley stoves, and hot water bathing, sick rates made a decided advance, due almost entirely to diseases of the respiratory tract. Pneumonia made its appearance and has proven especially fatal. The sanitary authorities immediately took steps to insure proper ventilation of tents as they believed that the tendency of the men to close every air hole had an important bearing upon the spread of the diseases in question. When Sibley stoves were installed a metal hood, with a hole through the side to accommodate the stove pipe was substituted for the canvas hood on all pyramidal tents. An order was issued requiring this hood to be raised 4 inches above the canvas, as shown in Fig. 12. This

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arrangement gives sufficient protection from rain and, at the same time insures a certain amount of ventilation. The position of the hood is not readily changed by the occupants of the tent and any neglect of the order requiring elevation is readily detected by riding through the regiment. Ventilation from the bottom of the tent was also ordered and inspections were required by the officers of the day, between midnight and reveille, to enforce the orders. Even with these precautions, however, these orders have not been thoroughly observed in some organizations.

The practice of bringing two cots together for the purpose of making a double bed became very common as the cold weather set in. This was prohibited as favoring the spread of respiratory diseases.

Major Nichols has been making a study of the epidemiology of the pneumonia cases with special reference to the types of pneumococci and for the purpose of ascertaining whether this disease is directly communicated from one individual to another. Some 350 cases have been investigated and there is evidence that some of them have been so transmitted.

GENERAL REMARKS

It is very important that our sanitary procedures in the field be placed on a more definite basis and left less to chance and individual caprice than is at present the case. In spite of the fact that the Army has spent much time in the field during recent years and has gained valuable experience in sanitary matters, we go at the making of a new camp like veritable amateurs and without any definite plans of what we are going to do. The type of latrine box, incinerator, or what not, adopted depends upon the experience or inexperience of the local quartermaster or sanitary authority. In the camps in this district, for instance, it required three months of persistent effort to have urine deflectors placed on latrine boxes. The latrine boxes also were not supplied with stops for the lids and they were not fly tight; the plans did not include platforms. The necessity for these things had been fully demonstrated in previous camps and were included in the plans on file in Washington, but no one appeared to think it necessary that these plans should be followed. In these matters the United States Army appears to have a determination not to profit by experience.

In the writer's opinion the best sanitary procedures for field use, as determined by a board of officers appointed by the War Department, should be embodied in a general order and made obligatory upon all concerned. No departures from standard plans should be permitted except for the purpose of experiment authorized and carried out under the supervision of the proper authorities.

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THE "SURGEON" AND MILITARY PREPAREDNESS[1]

By Colonel LOUIS A. LA GARDE
Medical Corps, United States Army, Retired

UNDER the terms of the National Defense Act, the Government is at this time making an effort to ascertain its resources in the event of war. This is done with a view to mobilizing the industries, trades, and professions when the call comes.

The medical profession enjoys the distinction of being the first of these bodies to be convened to commence a propaganda looking to medico-military preparedness and, all over this country, is now deliberating on ways and means to acquit itself becomingly when war is progressing.

The answer to the suggestion of preparedness has come from the profession as a whole: from the general practitioner, the sanitarian, the surgeon, internists and the more restricted specialties in the profession.

Medical men from civil life will enter the Army in time of war, mostly through the Medical Reserve Corps, and they will be assigned to duty in the military establishment as regimental surgeons, and to such other offices as the exigencies of the service may require, in accordance with their length of service and rank in the Reserve Corps, the grades in which are first lieutenants, captains, and majors in the Medical Department.

There will be others with appropriate rank assigned to duty in (1) immediate care of the sick and wounded; (2) as sanitarians, and (3) in the administration functions and sanitary formations on the line of communication, etc., etc.

I have known some surgeons, and here I have reference to those who practice surgery exclusively in civil life, to resent the idea of being asked to do aught but surgery in active campaign.

I had an assistant in the Spanish American War who told me that he had come to the front to do surgery, and when I told him that the battle was over, and the wounded had all been evacuted to home ports, and that we needed his services to care for Spanish prisoners and their camp, he was inclined to consider his lot rather hard, until I explained to him that he had entered the Army to serve his country, and that like a good soldier he should learn to obey orders without asking the reason why.

[1] A paper read at the joint meeting of the District of Columbia and Baltimore Medical Societies at Osler Hall, Baltimore, Md., March 16, 1917.

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Another medical officer, a major of volunteers, no less a doctor than my dear friend, Victor C. Vaughan of Ann Arbor, reported before the battle of Santiago had taken place. I knew that Dr. Vaughan's training had been on scientific lines. He was especially qualified as a sanitarian. He rendered special service to his country in this line of work, but when the battle was on, when we were very short of personnel, and we needed doctors to do surgical work, Vaughan was detailed to dressing wounds, cutting out bullets, and immobilizing fractures. He said not a word in remonstrance, but did the surgical work assigned to him as though he had always lived in a surgical atmosphere.

Finally the late Dr. Nicholas Senn reported; he was Corps Chief Surgeon of Volunteers with the rank of lieutenant colonel. We all knew Dr. Senn as a surgeon. He had been designated by the War Department as chief operating surgeon for all the armies in the field.

I met him at the landing and apologized for the dearth of surgery in camp. He arrived in Cuba when the fighting was over, and when all the wounded had been shipped north or otherwise cared for.

He said, "Well, if there is no surgery to do, can I not be of service otherwise?" I looked around and finally placed him in charge of about seventy Cuban refugees to clean camp. We had burned down the town of Siboney to get rid of yellow fever, and Senn, with his Cuban help, worked for days in the hot broiling sun of early July to clear away the smoldering ruins that we might have a suitable site for our hospital tents. Senn was by instinct a soldier. He had been the Surgeon General of the Illinois State troops for years, and was the founder of the Association of Military Surgeons. He was a typical, all-round, medical officer, just in the way that he was famed as a surgeon the world over.

Contrast the attitude of Senn and Vaughan in actual war, when the State needs maximum efficiency from every citizen of military age, with the following passage which I have just cut out of one of our medical journals.[2] "It is not a function of surgery to know about camps, troops, and reports, nor the etiquette of the salute, nor the thousand and one petty relics of military traditions;" and again, "Let the surgeons who give their skill for the comfort of the sick soldiers go to their task as surgeons—nothing more, nothing less."

There was another officer who reported at the same time that Dr. Senn did. He was then a captain in the United States Army Medical Corps, and here I refer to our present chief, Maj. Gen. William C. Gorgas, U. S. Army. He arrived at a psychological moment. He was an immune from yellow fever and he was among the few medical

[2] *Interstate Medical Journal*, Jan., 1917, p. 86. Is there a Military Surgery? by James Peter Warbasse, M. D., F. A. C. S.

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officers who had experience in the treatment of this dread disease. When he reported he wore a campaign hat, a blue flannel shirt, and blue trousers. I do not remember that this plain uniform even carried the insignia of rank. He was then the same mild mannered gentleman you see here tonight. His appearance was far from impressing one "with the etiquette of the salute and the thousand and one petty relics of military traditions." When he reported he did not say I came here to treat yellow fever—nothing more, nothing less. With a salutation to an old friend he said, "Sir, I report for duty."

In conclusion, let me say this: Lest some of you should be influenced by the vagaries of the essayist I have just quoted, I would recommend the Medical Reserve Corps in time of peace, to all medical men in civil life, including the surgeons. The more you study therein the duties of medical officers, the more efficient will you become in time of war. You will learn to accommodate yourselves from your surroundings in civil life to the environments in active campaign. You will be as much at home in the one as the other. Your life in time of war will be easier to bear and duty will become a pleasure. If the surgeon should seek to go to war—"as a surgeon, nothing more, nothing less," it will be necessary to wrap him in an aseptic gown and transport him to the war zone in a glass case. I wish to remind you that transportation to the fighting front is scarce for the most part in modern war, and that the medical men who reach there generally have to walk.

When a doctor goes to war as a medical officer, let him go with the unflinching devotion of a William C. Gorgas, a Victor C. Vaughan, and a Nicholas Senn—nothing more, nothing less.

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STANDARDIZATION OF FOOD INSPECTION

By Surgeon W. M. GARTON
United States Navy

SHIPS of the United States Navy have their food inspection subdivided under three departments, namely: Medical Officers' inspection, as to quality, the Officer-of-the-Deck, as to quantity, and the Supply Officer as to the specifications. It would seem that a more ideal way could not be devised in which responsibility could be more divided.

When I was ordered to duty as Fleet Surgeon, Atlantic Reserve Fleet, the medical officer having the Medical Guard was detailed to make inspections as called for in Article 2113, Naval Instructions. No definite time of delivery was specified, nor any special day when certain food stuffs should be delivered.

It is necessary to outline various steps as they occured, in order that the results obtained can be fully understood, and the justification fully established of the system instituted.

A board was appointed by the Fleet Supply Officer to make out in advance a uniform menu for the entire fleet for one month. Knowing what this menu was to be, it was comparatively easy to anticipate in advance the amount and kind of food required.

Schedule of delivery was next put in force, as well as a stated time of delivery.

The medical officer having the guard duty, being the inspecting officer, made all of the necessary and required inspections. Failure in not being up to specifications, failure in quality and quantity, failure in delivery within the specified time and day designated, necessitated much correspondence, all of which had to be referred to the Fleet Supply Officer, and the Fleet Surgeon for final action or decision. To eliminate all this confusion, to concentrate and co-ordinate authority, to prevent unnecessary delay, as well as to do away with personal equation of the many Inspecting Officers, it was decided that an officer having had previous experience, fully qualified and under the direction of the Fleet Surgeon was required, and that he alone was to do all the inspections for all the ships.

Note carefully the duty of a pharmacist as outlined in the Manual for Medical Officers, Article 1373. This officer's duties are here specifically outlined in this particular form of work, and on November, 1915 a pharmacist was ordered to United States Atlantic Reserve Fleet as

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an assistant to the Fleet Surgeon, and he was assigned as fleet food inspecting officer.

In order that any inspection shall be successful the plan adopted must be comprehensive and extensive, but not so elaborate as to be inadvisable, as well as impracticable. Inspecting officers must have a complete understanding of all the specifications and the ability not only to interpret them, but to apply such working or commercial tests as are generally recognized. In other words he must have a more or less technical knowledge with a practicable understanding of the principles involved, in order that a maximum service may be rendered.

Contractors, generally speaking, will only furnish such a quality or quantity as will be passed by an inspecting officer. In other words the material received is as high as the standard adopted by the officer detailed for that duty.

The cardinal points of any inspection are thoroughness, system, uniformity and equity.

A thorough inspection must be complete, whereby not only all articles are inspected as a whole, but every article carefully examined to see that it complies in all respects to the specifications involved. A hasty examination of the superficial layers, the picking at random, or a casual survey as a whole is not only inadequate, but invites sharp practices.

A systematic routine should be definitely adhered to. Nothing should be passed over, nor one method adopted for one inspection and some other for some subsequent one. The contractor knowing full well what to expect will so arrange his deliveries as to avoid confusion, and at the same time minimize delay and expedite delivery. Under this head a systematic plan of delivery is again mentioned and is fully outlined at the end of this article.

Uniformity of Inspection.—The personal equation enters into all inspections and by designating one officer especially qualified by previous experience and training, a standard is established and the government contractor is far better satisfied. Contractors soon learn who the well qualified, conscientious inspector is, as well as he who is either careless, or not painstaking, or is inclined to take only a nominal interest in his duty. The latter is only too eagerly sought after. Shrewdness is rapidly displayed and the opportunity quickly grasped, whereby inferior grades are passed and hence the Government receives a lower standard than specified. An instance of this was evidenced when a contractor having had his delivery rejected by the inspecting officer, the Fleet Pharmacist, made the remark: "We will have to put this off on someone else not so particular."

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Justice to the contractor soon wins his respect (if he is of the type desired and welcomed), and he, knowing what to expect by what is demanded, is enabled to more intelligently bid and supply. This reduces friction, which is unpleasant, to the minimum and finally results in great benefit to both parties concerned.

The source of supply should be carefully considered when the inspection is made, and credit should be given to the contractor when an honest effort is made to live up to his specification. The following schedules with instruction to the contractor, have been incorporated in the Fleet Regulation, and are given in full:

The Fleet Pharmacist shall be the food inspection officer and shall make the certification on form S. & A. No. 334. He shall fully familiarize himself with all specifications and notify the Fleet Surgeon of rejection, failures in delivery, etc.

The standard menu, approved by the Commander-in-Chief monthly, will be adhered to as closely as possible.

A food inspection officer will be designated by the Commander-in-Chief. The officer designated will inspect all food products (other than meats) for the Atlantic Reserve Fleet. His inspection will be for quality, as provided by Article 2113, Naval Instruction. His signed certificate on inspection calls (form 334), previously prepared by the ship concerned to cover each separate delivery, will be given the driver who will present same to the officer-of-the-deck of the ship to which the delivery is made. These calls should reach the food inspection officer on the day before delivery is required. No delivery will be accepted without this signed certificate. Navy specifications will be followed. The ruling of the inspecting officer will be accepted, unless an error is manifest and of sufficient importance to report to the Commander-in-Chief.

(Hours for Inspection: 9 to 11.30 a. m.)

Bread—Daily, except Sunday.
Milk—Daily.
Fowl—Saturdays or day before holidays.
Vegetables—Tuesdays, Thursdays, Saturdays.
(May 1 to October 1 daily.)
Fruits—Tuesdays and Fridays.
(May 1 to October 1, daily.)
Butter—Tuesdays and Fridays.
(May 1 to October 1, Tuesdays, Thursdays and Saturdays.)
Cheese—Tuesdays and Fridays.
(May 1 to October 1, Tuesdays, Thursdays and Saturdays.)
Eggs—Tuesdays and Fridays.
(May 1 to October 1, Tuesdays, Thursdays and Saturdays.)
Fish—Thursdays (June, July, August, Fridays a. m.).
Yeast—Fridays.

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Clams—Fridays.
Oysters—Fridays.
Ice Cream—Sundays or holidays.
Cake—Saturdays or day before a holidays.
Meats—Including *fowl*, will be inspected at Building No. 4.
Note—The above schedule may be departed from to meet the requirements of any special menu for holidays.

Orders shall be placed with contractors for delivery on the days specified in the schedule, care being taken that sufficient notice is given the contractor.

All persons connected with the commissary department will expedite in every way the delivery of provisions on board.

The medical officers have taken interest in seeing that the food has been properly prepared and with an intelligent inspection, the combined results have been a better grade of food, better prepared and in greater abundance. Complaints are a thing of the past, and praise the rule.

It would seem that if each navy yard had detailed a pharmacist, who, under the Senior Medical Officer, should have charge of food inspections, and who had a specially designated building equipped with the various commercial apparatus for required tests, the food supplied to the Navy would be of the standard anticipated, and the government contractors would be of the type which are urgently desired. Sanitary inspections of the source of supplies should also be made. It would seem that there is a field for greater activity along this line.

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RATIONS FOR BOYS' MILITARY TRAINING CAMPS

By First Lieut. WILLIAM EDWARD FITCH

Medical Reserve Corps, United States Army

"Old men bear want of food best; then those that are adults; *youths bear it least;* most especially children, and of them the most lively are the least capable of enduring it."

STATISTICS of normal food consumption in the adult are readily available, particularly so during the past few decades, in which a far reaching interest in the problem of human nutrition has engrossed the attention of physiologists and biological chemists.

The rapid progress which has recently been made in infant feeding has thrown light upon the dietetic needs of the human individual in early life. In fact, pediatric literature abounds in well-established facts pertaining to the caloric requirements of the infant; but there is, on the contrary, a singular dearth of statistical information pertaining to the actual food requirements and dietary habits of the young adolescent. In fact, both the physiology and pathology of the adolescent period offer a fertile field with abundant opportunity for research to extend this knowledge.

DuBois has done some splendid work in this particular field; he has shown by calorimetric experiment at the Russell Sage Institute of Pathology, that the actual food requirements of young boys is 25 per cent above that of the adult. The pubescent period in both sexes is marked by great physical growth and development.

The alimentation, at this period to meet the demands for wear and tear, growth and development should be very rich in easily digested *proteins*. There is no period in man's existence when there is greater need for suitable, wholesome nutritious alimentation—that which will supply the necessary energy for the daily wear and tear of the body; together with the requisite elements for growth and development, than at this period.

The adolescent youth should have a liberal allowance of whole wheat bread, fresh eggs, wholesome meat and fresh vegetables, and fruits of all kinds, provided he digests them well, but highly spiced food should be restricted.

A recent investigation by Gephart[1] affords an insight into the actual amounts of nourishments taken by more than 300 boys in one of the largest private boarding schools in the United States. The total

[1] In the Laboratory of the Russell Sage Institute of Pathology, from Editorial, *Jour. A. M. A.*

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animal supply for such an institution containing 355 boys was computed as follows, in metric tons—2,200 pounds:

	Protein	*Fat*	*Carbohydrate*
Food supply	20.5	25.6	60.5
Waste	3.8	5.4	4.2
Food fuel	16.7	20.2	56.3

The quantity of food, computed on the basis of the individual meal served, appears as follows:

	Pounds	*Grams*	*Calories*	*Calories (per cent)*
Protein	0.1107	50.2	206	14[2]
Fat	0.1332	60.4	562	39
Carbohydrates	0.3717	168.8	692	47
			1,460	100

The food was of the best quality, and included 193 separate varieties. The cost per meal was 20 cents, or 13.8 cents per 1,000 calories.

This is twice what the poor man in New York pays for his food. But these growing athletic boys were not satisfied with the conventional 3,000 calories per day. The investigator of their dietary ascertained that beside the 4,350 calories which they consumed daily at the table, they bought 650 additional calories in food at a neighboring store, the principal item being chocolate.

The following table[3] presents one estimate of the daily caloric requirements of a man weighing 156 pounds (70 kilos):

	Calories
1. Absolute rest in bed without food	1,680
2. Absolute rest in bed with food	1,840
3. Rest in bed 8 hours, sitting in chair 14 hours with food	2,168
4. Rest in bed 8 hours, sitting in chair 14 hours, walking 2 hours with food (professional men, clerks, etc.)	2,488
5. Rest in bed 8 hours, sitting in chair 14 hours, vigorous exercise 2 hours, with food	2,922
6. California farmers' families require 97 grams protein with other food to yield	3,515
7. California farm laborers require 144 grams protein with other food to yield	4,100
8. A mechanic requires 140 grams protein and other food to yield	3,500
9. A ploughman requires 140 grams protein and other food to yield	4,000
10. Connecticut football team in training required 181 grams protein and other food to yield	5,740

[2] Seventy per cent of this was in animal protein.

[3] From Vol. 3, Chapter xii, Foods and Feeding in Health and Disease. By the Author.

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11. California football team required 270 grams protein and other food to yield 7,885
12. Harvard boat crew required 153 grams of protein and other food to yield 4,620
13. Yale boat crew required 171 grams of protein and other food to yield 4,070
14. A man sawing wood required 185 grams of protein and other food to yield 5,700

From this table we see that a patient in hospital requires a minimum of 1,840 calories if the diet is to maintain the metabolic balance. If he should not be confined to bed he will require a minimum of 2,168 calories; and these estimates do not take into account any unusual demands made because of the increased wear and tear caused by the disease process. A California farmer's family requires a daily ration yielding 3,515 calories, while the farm laborer requires 4,100 calories; a mechanic 3,500 calories; a ploughman, 4,000; a boy in a Connecticut college football team requires 5,740 calories; on the Harvard boat crew, 4,620 calories; on the Yale boat crew, 4,070, while a man sawing wood needs 5,700 calories. The fuel to furnish the required energy may be derived from the consumption of proteids, fats or carbohydrates.

Lusk[4] points to the fact that 5,000 calories is the amount of energy a real live American boy needs. A dietary furnishing only 2,800 or 3,000 calories will not sustain the growing youth, as evidenced by the "ravenous" appetite of boys. Lack of appreciation of this fact and failure of providing for it are the contributing causes of undernutrition in young boys.

The facts presented above, based on a liberal series of investigations and observations, rather than a few sparsely scattered data, deserve emphasis to and attention of medical men, and in these late days of military preparedness, particularly of the army officer who has charge of rationing boys' military training camps.

I have had some experience with boys in camp and realize the necessity for a well-balanced ration for these youngsters, particularly with a liberal protein content which is easily digested and readily assimilated.

It was my privilege to be ordered to Fort Terry last July for service with the Boys' Military Training Camp, and it was a part of my duty to daily inspect the kitchens, the cooking and serving of the food for the boys. I soon became convinced that the officers who planned the rations, while they did remarkably well under the circumstances, were lacking in experience in rationing young and growing boys. I append herewith the menus for the first week of the camp.

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[4] Graham Lusk—"Food Economics." *Journal of Washington Academy of Science*, Vol. 6, p. 340, 1916.

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MENU BOYS' MILITARY TRAINING CAMP, FORT TERRY, N. Y., 1916

July 7

		Grams	Calories	Total calories
Breakfast:				
Corn flakes	5 tablespoonfuls	65	81	
Eggs, boiled	2	100	160	
Bread	2 slices	60	160	
Butter	1 large square	15	120	
Breakfast cocoa, milk and sugar	1 cup	240 c.c.	279	
				800
Dinner:				
Roast beef	liberal helping	100	343	
Brown gravy	2 tablespoonfuls	30 c.c.	25	
Stewed peas	3 heaping tablespoonfuls	92	111	
Boiled new potatoes	3 medium sized	150	145	
Bread	2 slices	60	160	
Butter	1 large square	15	120	
Coffee, milk and sugar	1 cup	240 c.c.	156	
				1,160
Supper:				
Fried bologna	liberal helping	100	258	
Fried potatoes	liberal helping	50	290	
Stewed apples	3 heaping tablespoonfuls	100	120	
Bread	2 slices	60	160	
Butter	1 large square	15	120	
Coffee, milk and sugar	1 cup	240 c.c.	156	
				1,104
Total calories for day				3,064

July 8

		Grams	Calories	Total calories
Breakfast:				
Oatmeal and milk	3 heaping tablespoonfuls	100	201	
Fried pork sausage	2 links	70	328	
Boiled potatoes	1 large	150	145	
Bread	2 slices	60	160	
Butter	1 large square	15	120	
Coffee, tea and sugar	1 cup	240 c.c.	156	
				1,110
Dinner:				
Pork and	1 slice	30	294	
Beans	4 heaping tablespoonfuls	80		
Pickles		0	0	
Catsup		0	0	
Stewed tomatoes	2 heaping tablespoonfuls	100	16	
Vegetable soup	6 ounces	180 c.c.	35	
Bread	2 slices	60	160	
Butter	1 large square	15	120	
Coffee, milk and sugar	1 cup	240 c.c.	156	
				781
Supper:				
Creamed cheese	liberal helping	80	364	
Potato salad	3 tablespoonfuls	100	123	
Queen olives	3 large	30	60	
Stewed peaches	3 tablespoonfuls	100	228	
Iced tea	1 glass	240	40	
Bread	2 slices	60	160	
Butter	1 large cube	15	120	
				1,095
Total calories for day				2,986

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July 9

		Grams	Calories	Total Calories
Breakfast:				
Farina	liberal helping	100	56	
Fried eggs	2	100	160	
Bread	2 slices	60	160	
Butter	1 large square	15	120	
Coffee, milk and sugar	1 cup	240 c.c.	156	
				652
Dinner:				
Roast pork loin	liberal helping	100	210	
Stewed corn	2 heaping tablespoonfuls	100	101	
Mashed potatoes	2 heaping tablespoonfuls	100	112	
Bread	2 slices	60	160	
Butter	1 large square	15	120	
Coffee, milk and sugar	1 cup	240 c.c.	156	
				859
Supper:				
Cold sliced ham	1 slice	33	93	
Potato salad	2 heaping tablespoonfuls	100	112	
Jelly fruit, pure	3 heaping tablespoonfuls	125	201	
Iced tea and sugar	1 glass	240 c.c.	100	
Bread	2 slices	60	180	
Butter	1 large square	15	120	
				806
Total calories for day				2,317

July 10

Breakfast:				
Oatmeal and milk	3 heaping tablespoonfuls	100	201	
Pork sausage	2 lengths	70	328	
Bread	2 slices	60	160	
Butter	1 square	15	120	
Cocoa and sugar	1 cup	240 c.c.	279	
				1,088
Dinner:				
Corn beef	1 large slice	50	145	
Cabbage	3 heaping tablespoonfuls	100		
Boiled potatoes	1 medium size	150	145	
Bread	2 slices	60	160	
Butter	1 square	15	120	
				570
Supper:				
Macaroni and cheese	2 heaping tablespoonfuls	140	477	
Stewed tomatoes	2 heaping tablespoonfuls	70	16	
Assorted cakes	3 cakes	150	300	
Bread	2 slices	60	160	
Butter	1 square	15	120	
Coffee, milk and sugar	1 cup	240 c.c.	156	
				1,229
Total calories for day				2,887

July 11

Breakfast:				
Corn flakes and milk	4 heaping tablespoonfuls	115	93	
Boiled eggs	2	100	160	
Bread	2 slices	60	160	
Butter	1 square	15	120	
Coffee, milk and sugar	1 cup	240 c.c.	156	
				689

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		Grams	Calories	Total calories
Dinner:				
Roast beef	liberal helping	125	140	
Fresh stringless beans	liberal helping	120	30	
Boiled potatoes	1 large	150	145	
Stewed tomatoes	2 heaping tablespoonfuls	70	16	
Bread	2 slices	60	160	
Butter	1 square	15	120	
Tapioca pudding	3 heaping tablespoonfuls	110	172	
				783
Supper:				
Beef pot roast	large slice	100	357	
Stewed sweet corn	1 ear	100	100	
Bread	2 slices	60	160	
Butter	1 square	15	120	
Jelly	1 heaping tablespoonful	35	113	
Iced tea, sugar	1 glass	240 c.c.	80	
				930
Total calories for day				2,402
	July 12			
Breakfast:				
Sliced oranges	1 A size	250	96	
Milk toast	2 slices	180	260	
Butter	2 squares	30	240	
Cocoa	1 cup	240 c.c.	279	
				875
Dinner:				
Roast mutton	1 large slice	75	234	
Gravy	2 tablespoonfuls	30 c.c.	25	
Stewed peas	3 tablespoonfuls	92	110	
Mashed potatoes	2 tablespoonfuls	100	112	
Bread	2 slices	60	160	
Butter	1 square	15	120	
				761
Supper:				
Frankfurters	3 large	100	258	
Potato salad	3 tablespoonfuls	100	123	
Bread	2 slices	60	160	
Butter	1 square	15	120	
Stewed apples	3 tablespoonfuls	80	200	
Coffee, milk and sugar	1 cup	240 c.c.	156	
				1,017
Total calories for day				2,653
	July 13			
Breakfast:				
Fried bacon	2 slices	35	140	
Oatmeal	3 tablespoonfuls	100	201	
Bread	2 slices	60	160	
Butter	1 square	15	120	
Coffee, milk and sugar	1 cup	240 c.c.	156	
				777
Dinner:				
Pork and	1 slice	30	294	
Beans	4 heaping tablespoonfuls	80		
Vegetable soup	4 ounces	240 c.c.	35	
Catsup		0	0	
Bread	2 slices	60	160	
Butter	1 square	15	120	
Rice pudding	2 heaping tablespoonfuls	110	179	
Milk	1 glass	240 c.c.	157	
				945

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Supper		*Grams*	*Calories*	*Total Calories*
Pink salmon	2 tablespoonfuls	100	198	
Potato salad	3 tablespoonfuls	100	123	
Iced tea	1 glass	240 c.c.	80	
Queen olives	3 large	30	60	
Bread	2 slices	60	160	
Butter	1 square	15	120	
Fig newtons	3 cakes	85	308	
			—	1,049
Total calories for day				2,771

I have amplified the menus by showing the quantity of the servings represented in grams giving the fuel or energy value of each article of food in calories, the total calories for each meal, for each day and for one week, showing a daily average of 2,714 calories. Students of trophodynamics who have given much thought to the dietary requirements of a young American boy know that the above ration is lacking in fuel value, especially so when we remember that the boy requires one-half as much more as a farmer at his occupation, which is strenuous.

Various authorities have estimated the protein requirements as ranging from 60 to 150 grams. Voit's standard was 118 grams, Chittenden thinks 60 grams sufficient, while Atwater's standard at moderate work is 125 grams, and at severe work 150 grams. As previously stated the growing boy needs a larger percentage of available protein in his dietary than the adult. He not only needs it for the necessary wear and tear upon the tissues, the same as the adult, but in addition the requisite amount for growth and development. Moreover, the bodily needs do not depend upon protein but *useful protein*. A complete protein contains about 17 amino-acids, and while most animal protein is complete, many vegetable proteins are not.

Therefore, depending upon the variety of protein furnished, it will appear that it may become necessary to consume several times the amount of protein actually catabolized in order to obtain *sufficient useful protein*. Since we cannot consult a chemist daily with regard to the amino-acid components of various proteins, we will err on the side of safety by allowing the boy to ingest slightly more than is absolutely necessary.

Careful experimental research has emphasized the fact that the individual needs a specific amount of food which will vary according to his structure and surroundings; he will need protein, carbohydrates, fats, water, and in addition mineral salts; it is absolutely essential that certain types of proteins, certain types of fats and certain salts be included in the dietary, and, besides, he must have other "accessory substances" generically called vitamines, if he is to show physical growth. It is recognized at the present time that something more is essential for the maintenance, growth, development and well-being of

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man than the ternary food elements just mentioned. Foods contain a minute proportion of "accessory substances," and when these are deficient or absent from the dietary, the immature body does not grow, the mature body does not maintain a normal healthy condition, and manifestations of disease soon appear.

Vitamines are contained in varying proportions in all food products, some food constituents being rich in them and others very poor. Again in other foods the vitamines are abstracted or destroyed in the various processes of preparation and cooking; an ordinary mixed diet contains sufficient vitamine to maintain normal constructive metabolism.

Unless food contains sufficient vitamine principles, no matter how well balanced the ration may be in the ternary food elements, nor how large quantities are consumed, nor how high the caloric value may be, there will be malnutrition. This is the case among the poor, who consume large quantities of food which is neither proportionately balanced nor sufficiently varied to furnish the requisite vitamine content, and for this reason diseases of malnutrition are common.

Many natural foods contain these "accessory" and vitally necessary "substances." Yeast, for instance, is rich in vitamines; the yolk of eggs, fish, brain, liver, kidneys, sweetbread, oatmeal, the various legumes—beans and peas, barley, wheat and corn, while fresh milk and meat contain vitamine in small amounts. Vitamines are fairly susceptible to a temperature of 100 C., but a temperature beyond 120 C. for any lengthy period of time will destroy most of the physiological activity of the vitamines originally present in foods. Therefore *canned* vegetables, fruits and meats are devoid of vitamine because of the excessive degree of heat necessary to sterilize the food sufficiently for preservation. Funk has recently experimented with canned beef (the ordinary brands furnished by contracting packers for the U. S. A.) and found that when comprising, with water, the sole aliment of a dog that he died in two weeks, while control animals allowed the usual menu for dogs remained in fine physical condition. The following foods are relatively poor in vitamines: sterilized (canned) milk, sterilized (canned) meat, cabbage, turnip, carrots and like vegetables; all dried vegetables; dried fruits; highly milled cereals (white patent roller process flour, finely bolted corn meal and polished rice), pork, molasses and corn syrup.

The cooking of food is an art. By scientifically applying the requisite temperature certain flavors are developed which tend to increase the appetite, but on the other hand much good food is wasted by careless cookery. Cooking, moreover, destroys the tough cellulose coverings of vegetables, thus permitting them to be more easily acted upon by the various digestive fluids. Oatmeal, for instance, should

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be boiled on a slow fire for four or five hours, and unless it is so cooked not more than 50 per cent of its fuel value will be available. The cook can put the oatmeal in a large boiler on the rear of his stove when he starts supper and the cooking can be continued after supper is served, until all the cellulose coverings of the starch granules are ruptured, which takes from four to five hours. Then it is all ready for breakfast except the time necessary to thoroughly warm it ready to serve.

Below I append a daily menu for one week of what I consider a well-balanced ration for a growing boy, this ration will furnish about 125 grams of protein daily and an average of about 4,300 calories.

PROPERLY BALANCED DIETARIES FOR BOYS' MILITARY TRAINING CAMPS

Showing requisite amounts of the ternary food elements and fuel or energy value calories

Monday

Breakfast:	*Serving*	*Grams*	*Calories*	*Total calories*
Orange	1 medium	250	96	
Oatmeal, milk and sugar	3 tablespoonfuls	100	201	
Eggs	2 boiled	100	160	
Fried bacon	2 slices	35	140	
Bread	2 slices	60	160	
Butter	1 square	15	120	
Coffee, milk and sugar	1 cup	240 c.c.	156	
Salt, pepper			—	1,033
Dinner:				
Creamed pea soup	6 ounces	180 c.c.	243	
Roast beef	1 slice	100	343	
Brown gravy				
Lima beans	2 heaping tablespoonfuls	80	128	
Mashed potatoes	2 heaping tablespoonfuls	100	112	
Lettuce	½ head	200	10	
American cheese	1 ounce	31	136	
Bread	2 slices	60	160	
Butter	1 square	15	120	
Bread pudding	3 heaping tablespoonfuls	155	338	
Cocoa	1 cup	240 c.c.	279	
Salt, pepper, pickles, catsup			—	1,869
Supper:				
Lamb or pork chop	1	100	200	
Macaroni and cheese	2 heaping tablespoonfuls	140	477	
Sliced tomatoes	1 medium size	200	46	
Bread	2 slices	60	160	
Butter	1 square	15	120	
Peach pie	one-sixth	126	352	
Iced tea	1 glass	240 c.c.	80	
Salt, pepper, pickles, catsup			—	1,435
Total calories for day				4,337

Tuesday

Breakfast:				
Stewed prunes	6	120	312	
Shredded wheat, milk and sugar	1	69	205	
Scrambled eggs	2	100	160	
Baked hash	2 heaping tablespoons	100	140	

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	Serving	*Grams*	*Calories*	*Total calories*
Bread	2 slices	60	160	
Butter	1 square	15	120	
Coffee, milk and sugar	1 cup	240 c.c.	156	
Salt, pepper			—	1,253
Dinner:				
Tomato soup	6 ounces	180 c.c.	186	
Roast lamb	1 slice	100	200	
Baked beans	3 heaping tablespoons	115	152	
Baked potatoes	1 large	150	160	
American cheese	1 ounce	31	136	
Bread	2 slices	60	160	
Butter	1 square	15	120	
Indian meal pudding	2 heaping tablespoonfuls	164	324	
Cocoa, milk and sugar	1 cup	240 c.c.	279	
Salt, pepper, pickles, catsup			—	1,717
Supper:				
Cold roast beef	1 medium slice	100	300	
White potatoes	3 heaping tablespoonfuls	145	350	
Cucumbers	3 thin slices	50	9	
Green corn	1 ear	100	100	
Bread	2 slices	60	160	
Butter	1 square	15	120	
Sugar cakes	3	15	75	
Lemonade	1 glass	240 c.c.	150	
Salt, pepper, pickles, catsup			—	1,264
Total calories for day				4,234

Wednesday

Breakfast:				
Cantaloupe	½ medium	465	93	
Oatmeal, milk and sugar	3 tablespoonfuls	100	201	
Eggs	2 soft boiled	100	160	
Broiled ham	1 slice (small)	35	140	
Bread	2 slices	60	160	
Butter	1 square	15	120	
Coffee, milk and sugar	1 cup	240 c.c.	156	
Salt, pepper			—	1,030
Dinner				
Creamed corn soup	6 ounces	180 c.c.	150	
Roast ham	1 large slice	100	210	
Boiled cabbage	3 heaping tablespoonfuls	100	5	
Lettuce	½ head	2	10	
Baked beans, home made	3 heaping tablespoonfuls	115	298	
American cheese	1 ounce	31	136	
Creamed potatoes	4 heaping tablespoonfuls	115	140	
Olives	3 medium	30	60	
Bread	2 slices	60	160	
Butter	1 square	15	120	
Rice pudding	3 heaping tablespoonfuls	165	257	
Cocoa, milk and sugar	1 cup	240 c.c.	279	
Salt, pepper, pickles, catsup			—	1,825
Supper:				
Steak	1 medium slice	100	185	
Potato chips	3 heaping tablsepoonfuls	50	295	
Cream cheese	2 cubic inches	40	180	
Creamed onions	3 small	100	125	
Bread	2 slices	60	160	
Butter	1 square	15	120	
Apple pie	one-sixth	126	352	
Water	1 glass	240 c.c.	...	
Salt, pepper, pickles, catsup			—	1,417
Total calories for day				4,272

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Thursday

	Serving	*Grams*	*Calories*	*Total calories*
Breakfast:				
Stewed prunes	6 medium	120	312	
Force	5 heaping tablespoonfuls	18	66	
Eggs	2 soft boiled	100	160	
Bacon, fried	2 slices	60	140	
Bread	2 slices	60	160	
Butter	1 square	15	120	
Orange marmalade	1 heaping tablespoonful	30	105	
Coffee	1 cup	240 c.c.	156	
Salt, pepper			—	1,219
Dinner:				
Potato and meat soup	6 ounces	180	210	
Roast beef	1 slice	100	357	
String beans	4 heaping tablespoonfuls	120	26	
Baked potatoes	1 medium size	130	149	
Sliced tomatoes	1 medium size	200	46	
American cheese	1 ounce	31	136	
Bread	2 slices	60	160	
Butter	1 square	15	120	
Ice cream	2 heaping tablespoonfuls	100	190	
Chocolate cakes	1 medium slice	70	258	
Cocoa	1 cup	240	279	
Salt, pepper, pickles, catsup			—	1,931
Supper:				
Pork chop	1 chop	70	113	
Macaroni and cheese	2 heaping tablespoonfuls	140	470	
Sliced beets	2 heaping tablespoonfuls	70	29	
Green corn	1 ear	100	100	
Sliced cucumbers	8 thin slices	50	9	
Bread	2 slices	60	160	
Butter	1 square	15	120	
Peach pie	one-sixth	126	360	
Salt, pepper, pickles, catsup			—	1,361
Total calories for day				4,511

Friday

Breakfast:				
Peaches	1 average size	128	44	
Oatmeal, milk and sugar	3 heaping tablespoonfuls	100	201	
Eggs	2 soft boiled	100	160	
Bread	2 slices	60	160	
Butter	1 square	15	120	
Toasted cheese	2 ounces	50	250	
Coffee, milk and sugar	1 cup	240 c.c.	156	
Salt, pepper			—	1,091
Dinner:				
Creamed pea soup	6 ounces	180 c.c.	243	
Fresh haddock or white fish	liberal helping	100	108	
Lima beans	3 heaping tablespoonfuls	120	200	
Creamed mashed potatoes	4 heaping tablespoonfuls	115	141	
Sliced tomatoes	1 medium sized	200	46	
American cheese	1 ounce	31	136	
Bread	2 slices	60	160	
Butter	1 square	15	120	
Bread pudding	3 heaping tablespoonfuls	155	337	
Queen olives	3 medium sized	30	60	
Cocoa	1 cup	240 c.c.	279	
Cakes	2	22	94	
Salt, pepper, pickles, catsup			—	1,924

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Supper:	*Serving*	*Grams*	*Calories*	*Total calories*
Vegetable soup	6 ounces	180 c.c.	24	
Baked beans	4 table spoonfuls	200	400	
Cheese and macaroni	3 heaping tablespoonfuls	140	441	
Sliced tomatoes	1 medium sized	200	46	
Bread	2 slices	60	160	
Butter	1 square	15	120	
Lemon pie	one-sixth	110	288	
Lemonade	1 glass	250 c.c.	174	
Salt, pepper, pickles, catsup			—	1,653
Total calories for day				4,668

Saturday

Breakfast:				
Stewed prunes	6	120	312	
Shredded wheat	1 biscuit	69	205	
Eggs	2 boiled	100	160	
Baked hash	2 tablespoonfuls	100	140	
Bread	2 slices	60	160	
Butter	1 square	15	120	
Coffee	1 cup	240 c.c.	156	
Salt, pepper			—	1,253
Dinner				
Creamed corn suet	6 ounces	180	160	
Roast beef	1 slice	100	310	
Cauliflower	3 heaping tablespoonfuls	180	12	
String beans	3 heaping tablespoonfuls	90	18	
White potatoes	3 heaping tablespoonfuls	145	350	
Bread	2 slices	60	160	
Sliced tomatoes	1 medium sized	200	47	
Butter	1 square	15	120	
Rice pudding	3 heaping tablespoonfuls	165	257	
Olives	3 medium	30	60	
Cocoa	1 cup	240 c.c.	279	
Salt, pepper, pickles, catsup			—	1,773
Supper:				
Mutton chop	1 chop	100	135	
Potato chips	3 heaping tablespoonfuls	50	295	
Green corn	1 ear	100	100	
Sliced cucumbers	8 thin slices	200	9	
American cheese	1 ounce	31	136	
Bread	2 slices	60	160	
Butter	1 square	15	120	
Peach pie	one-sixth	126	352	
Lemonade	1 glass	250 c.c.	150	
Salt, pepper, pickles, catsup			—	1,457
Total calories for day				4,483

Sunday

Breakfast:				
Cantaloupe	½ medium	465	93	
Oatmeal, milk and sugar	3 heaping tablespoonfuls	100	201	
Eggs	2 boiled	100	160	
Breakfast bacon	2 slices	35	140	
Bread	2 slices	60	160	
Currant jelly	1 heaping tablespoonful	35	113	
Butter	1 square	15	120	
Coffee, milk and sugar	1 cup	240 c.c.	156	
Salt, pepper			—	1,143

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Dinner:	*Serving*	*Grams*	*Calories*	*Total calories*
Water melon	1 large slice	300	40	
Bean soup	6 ounces	180 c.c.	70	
Olives	3 medium	30	60	
Roast chicken	liberal helping	100	273	
Baked potatoes	1 large	150	160	
Radishes	6	50	8	
Sliced tomatoes	1 medium sized	200	46	
Green peas	3 heaping tablespoonfuls	92	110	
Bread	2 slices	60	160	
Butter	1 square	15	120	
Bread pudding	3 heaping tablespoonfuls	155	337	
Ice cream	2 heaping tablespoonfuls	100	189	
Cocoa	1 cup	240 c.c.	279	
Salt, pepper, pickles, catsup			—	1,852
Supper:				
Chicken soup	6 ounces	180 c.c.	78	
Baked beans	4 heaping tablespoonfuls	200	400	
Baked macaroni and cheese	2 heaping tablespoonfuls	100	300	
Sliced tomatoes	1 medium sized	200	46	
Green corn	1 ear	100	100	
Bread	1 slice	30	80	
Butter	1 square	15	120	
Peach pie	one-sixth	126	252	
Salt, pepper, pickles, catsup			—	1,376
Total calories for day				4,371

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NOTES ON THE ORGANIZATION OF THE FRENCH SANITARY SERVICE

By Major JAMES ROBB CHURCH
Medical Corps, United States Army; Military Observer
(With one illustration)

1. AT FIRST it is difficult for anyone accustomed to the method of procedure in our own Army to form a clear idea of the working principles of the French service. All our own methods are basically dependent on the idea of centralization; that orders and changes save the relatively unimportant shall emanate from one bureau and from that solely. A good illustration of that is the fact that privates of the various staff corps are assigned to station by War Department order and that any change in their status must come through the same channel. To understand the method of the French we must, in the beginning, recognize the fact that while we are exponents of centralization, they depart very widely from this system and authority is not confined to the bureau. Whereas we have always been subject to the direction of the central authorities in Washington, whether in time of peace or war, the French made a definite distinction and there is no absolute limit where bureaucratic rule ends. In operation the territory is broadly divided into two areas:

(*a*) The zone of the interior.

(*b*) The zone of the armies.

Over the first of these two, the war department and the ministry have control, but their authority stops with its limits and the general-in-chief is the supreme ruling authority in the zone of the armies and cannot be hampered nor interfered with by bureau control. The limit of demarcation of these zones is not laid down in accordance with geographic boundaries, but in accordance with the necessities of the case: it is determined in the first place by the ministry, and after that designation the control in each is definite and limited. The zone of the interior is naturally principally concerned with the upkeep of the elements of the zone of the armies: it is the duty of this division to see that things are arranged so that the business of the fighting units can be forwarded in the best possible manner.

It deals with the broad question of supply, both of men and material, and in every way backs up the fighting force at the front. Of course there is proper correlation of the two services, but there is no overlapping. One is strictly under military control and the other combines the military with the civil. All French system has tended toward preparedness: compulsory service in the army is one evidence,

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but, aside from that, the general trend has been along the same line, and with the lesson of 1870 clear in mind, the government has since that time been taking steps to ensure a more serious defense of national rights than was possible in those disorganized days.

2. Of course, basically, the policy of the country is in the hands of congress and the ministry; the general-in-chief is so appointed, but once placed in control he is not hampered as were our own commanders during the Civil War. He is supreme in the theater of operations until he is deposed by the authority which made him.

3. The zone of the armies is further divided for the purposes of convenience into:

(*a*) The zone of the advance.

(*b*) The zone of the rear,

and the latter has a further subdivision known as the zone of the line of communication. It is well to bear in mind that the zone of the rear has no connection with the zone of the interior, as has been stated in some reports on the French system: it is strictly a part of the zone of the armies and absolutely under the command of the general in chief and his delegates.

4. As far as territorial distinction goes, then, we have the two broad division of the army and the interior with the further subdivision of the first as given in paragraph 3. To understand where responsibility falls, it is well to have a look at the different elements of command.

There are in the field in France today eight or nine armies: the direction of all of these falls on the general-in-chief, or "Generallisime." Each of these armies has its own general in command subject to the orders of the general in chief. The general-in-chief does not attempt to direct the internal policy of the armies which are integral parts of the whole; this is the individual duty of the general commanding the army and, so long as results are forthcoming, he is at liberty to pursue his own way in regard to his particular administration.

5. The headquarters of the general in chief consists of advisers and a special chief of staff, who is practically the assistant commander in chief of all the French armies in all theaters of operations: a chief of staff of the armies on the western front who is assisted in his work by four general staff officers, each of whom is assigned in charge of one of the four bureaus of the general staff (western front). These four bureaus are as follows:

(*a*) Bureau administration.

(*b*) Bureau information.

(*c*) Bureau operations.

(*d*) Bureau military R. R. s.

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The various staff services have no chiefs of service assigned to the headquarters of the general in chief, nor are there any functions laid down for such chiefs. All of the higher administrative work is centralized at the headquarters of the different armies which leaves only questions of the very broadest character to be considered and coördinated at the G. Q. G. This latter work at the G. Q. G. is centralized in the first bureau. For this purpose at this bureau, specially selected members of the sanitary service as well as all other administrative services are attached. These specially selected officers, in addition to lending their advice in the preparation of orders relating to their own particular services, also act as semi-official agents of liaison with the minister of war in matters relating to the coördination of the sanitary service in the zone of the armies with the sanitary service in the zone of the interior. They also travel around a great deal in the zone of the armies picking up ideas and looking for weak spots, which they report on their return to the chief of the first bureau so that the necessary corrective measures may be instituted or other orders promulgated, providing for putting into effect new ideas which have been advanced. It will be seen from the foregoing that while these officers have no direct administrative function, nevertheless they have a direct influence in the preparation of all orders and instructions of a broad general character which are issued from the G. Q. G.

While on its face, the fact of so important a service as the sanitary service not being represented by a chief surgeon as we understand this office may be open to criticism, I believe that, on the other hand, more effective work is accomplished under the French system and with much less effort, clerical and otherwise, than would be the corresponding case in our service.

6. After the general in chief and his headquarters and general staff comes the commander of a group of armies which may be variable in number. This has only a general staff and no unit corresponding to the grand headquarters. Next in order comes the organization of the army. This has its own headquarters and its own general staff accountable to the general commanding that particular army. The sanitary service is represented on this, and the representative has general charge of the sanitary matters which pertain to this particular unit. The general in command of an army is not dependent on higher authority for matters of internal administration in his own command. I mean to say that if one of his medical officers is in any way unsatisfactory, he does not have to correspond with higher authority in order to bring about a change: he either sends him back into the interior with notice of his shortcomings or transfers him to duty commensurate with his ability or lack thereof.

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7. The next following units are the army corps and the division, each of which has its own general staff (Etat Major).

From this we come to the ultimate unit which is the regiment and this concludes in a general view, the units to be considered. To resume, we have in the zone of the interior, the war department and the ministry whose duty, as a matter of fact, is to keep the fighting force provided and supplied. Going across the arbitrary line of division, we find the general in chief who commands everything in the fighting field, then in further progression the group of armies, the army and under the latter, the corps, division and regiment. It will be noticed that the functions of similar officers in each of the divisions are analogous.

Fig. 1 gives a general representation of the different channels of orders and communications.

8. In following the organization of the service, it is perhaps as logical to begin with the advance and consider the various steps and the personnel concerned in them. The personnel, and certain parts of the matériel of the different units will be found in the official tables and I shall not, therefore, quote them in the body of this report. Fuller data in regard to complete equipment may be obtained from the regulations for the government of the sanitary service and from the various handbooks. It might be well to state that the best handbook is probably that written by Toussaint, entitled "La Direction du Service de Santé en Campagne," the fifth edition of which, published in 1915, is up to date with a few exceptions. Of course, the conditions prevailing in the present conflict between Germany and the Allies are at variance with the general idea of war in many particulars: the employment of unusual vulnerating agents give us a different class of wound and, more particularly in the western theater of war, the interlocking of the opposed lines in trench warfare converts the whole struggle into one gigantic siege.

Transportation conditions exist as between fairly well fixed points and there is not the element of motility which is a concomitant of a strife dependent on actions which involve constant advance and retreat. It is possible for this reason to organize the service with more definite relation to base than would be possible when dealing with a marching army which gave little opportunity for the careful organization of units for a long stay in one locality. Therefore, it is not possible to consider, from the standpoint of actual experience, the functions of the service under these conditions; we are limited to the style of combat which has been current since the French advance and the German retreat in 1914—the war of the trenches. In dealing with the various fractions, I shall, therefore, place less stress on the normal functioning than on that which actually exists at the present time.

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9. Aside from the everyday function of taking care of the men who are sick, and the duties of general sanitary supervision, the rôle of the *regimental* sanitary personnel is the treatment appropriate to the wounded of their organization. This lies between the limits of the first line trenches (possibly beyond them in the event of an attack), and the Poste de Secour, which latter is the limitation of regimental responsibility. The care in the trenches themselves involves the dressing of men who have been hurt and their removal to the Poste de Secour. This removal involves a step in another station, the refuge for wounded. It is not practicable at times of artillery fire to evacuate the wounded direct to the Poste de Secour and it is for that reason that the refuge is adopted. The character of the refuge depends on circumstances of the terrain, but its ultimate object is to afford a place where those who have been hit can be protected from further injury until it is practicable to send them to the Poste de Secour, or under some circumstances, directly back to the ambulance of the first line. In the refuge there is good protection from artillery fire and absolute protection from rifle fire, and here there is generally a simple store of dressings and essentials so that what is necessary may be done. Transfer from this point to the Poste de Secour is accomplished by the regimental personnel in case the injured man is unable to proceed himself. Trench warfare has made necessary the devising of special means for the transportation of men unable to walk, over this section of the line of evacuation. The normal route is by the "Boyau." Boyau in French means an intestine, and the name has been given to these approach trenches in recognition of their many twists and sharp angulations which are a requisite to prevent their being enfiladed by shell fire. Due to this fact, transport by the regulation litter is very frequently impossible and there have been many ingenious modifications to meet the condition. Wheelbarrows have been used and a number of special types of litter. There is the "Brancard Hamac" which is a hammock suspended from a single pole and carried by two bearers: there are a number which fall under the generic term of the "Brancard Pliant" or folding litter. At times it is possible to carry the wounded back over the surface of the ground or by paths and roads screened from observation, and advantage is taken of such conditions to obviate the difficult transfer through the approach trenches. When it is understood that these trenches are often a mile or more in length, it will be understood that evacuation by that route is not at best, easy. The Poste de Secour, or first-aid station, is usually located at the rear end of the approach trench and is protected from shell and rifle fire and is presided over by the regimental surgeon with sufficient personnel to insure the proper carrying out of the work.

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The regimental surgeon is accountable to his colonel, or to whoever commands the trench sector that he is located in. He is also in communication with the division surgeon in regard to technical orders and reports as shown in Fig. 1.

10. From the Poste de Secour, the wounded are moved to the ambulance of the first line, which is a division formation and which is located, as shown in Fig. 1, with that organization. The work of transfer falls, as far as theory goes, on the divisional litter bearers, but in actual practice, this work is now accomplished by one of the sections of automobile transport for the wounded, regular or volunteer, which may be responsible for evacuation in this section. The technical direction of this class of service falls on the division surgeon, who is responsible to the division commander and also to the surgeon of the army corps who is his superior in technical questions.

Use is made to some extent of horse-drawn transport, but the larger part of the evacuation is by motor transport. Use is made of the wheeled litter, thirty of which are a part of the equipment of each division group of litter bearers. These are of much service where it is not possible to send larger wheel transportation and they save much in the way of hand litter work. The divisional group of bearers may be used to supplement the work of clearing the battlefield of wounded.

The French have not found this service entirely satisfactory: complaint has been made that the men who perform it are not sufficiently under surveillance and that in consequence the work is done in a haphazard way; whether this complaint has a sound basis or not, I am not able to say.

The following extract from an article by Major Lachebre, entitled: "Notes on the Infantry Attack" gives the point of view of the line officer and it is open to question as to whether this type of service might not be performed in a more systematic fashion under the routine which he outlines. I think it is worthy of consideration:

THE REGIMENTAL LITTER BEARERS

"We are very willing to fight," the Zouaves of General Bruneau used to say in 1870, "but don't let us die like dogs if we are wounded." They would say it again today. The service of the regimental litter bearers is the only echelon of the sanitary service which has remained as defective today as at the beginning of the war. The advanced portions of the battlefield are still the lamentable domain of the saddest of deaths, the slow death which comes from lack of care.

The causes of this are the following:

The litter bearers are generally under the orders of the regimental surgeons. When the battle commences, all the surgeons are immediately rooted to the dressing stations, soon over-run with wounded, where they toil with the inde-

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fatigable devotion which we all admire. The litter bearers start out at random for the battlefield, and no definite idea about the zone of the regiment and *without leaders;* for the sergeant and three corporals of the litter bearers cannot be counted as such, as they generally busy themselves in the dressing stations, as unofficial hospital attendants. These litter bearers, although certain ones have distinguished themselves by the most meritorious acts, are not anxious, left to themselves, to commence their search, in the open behind our skirmishers in contact with the enemy. If it is day, it is a useless and forbidden sacrifice; if it is night, they can easily lose themselves. Other wounded are nearer, without even going out of the departure parallel; one wounded is as another; those then, nearest, will be the first helped. The others, who lie far away in the fields, at the mercy of a projectile which may finish them, or of a counter-attack which may massacre them, will wait two days, four days, six days in horrible agony. And so it is that the wounded are gathered always slowly, and *exactly in the inverse of the proper order.*

The surgeons never admit this; they praise the litter bearers because they have trained them, because at times, under their eyes, the litter bearers have done good work, and because they imagine that it will always continue so, when the litter bearers are far away from them.

But those who have spent a whole night in covering a field of battle where three regiments have attacked *without meeting one single squad of litter bearers,* are hoping for reforms.

Contrary to the hospital attendants, the litter bearers who are simple carriers should be handled by methods more *military* than *medical;* they should have a strong proportion of noncommissioned officers, receive from a reasonable commander (chief musician, color bearer or sergeant of litter bearers) very accurate orders about the dividing up of the ground to be searched, orders resulting from a liaison between this commander and the commanders of the battalions engaged. A severe inspection of the rôle of each litter bearer squad must be organized, and any litter bearer who has acted according to his own ideas and anywhere, must be, without pity, put back into the ranks.

It must be observed that the success of the business of the litter bearer is dependent upon several of the conditions given above. Terrain clearly prepared and plotted, exact plan, dispositions of the regiment in a depth on a narrow front.

So everything is bound together, and it is again the case of preparing the terrain which will increase the courage of the soldier, freed from the obsession of not being promptly helped if he is wounded in the first line.

11. In addition to the group of bearers, the division has with the combat train two "ambulances." In the event of action, these are sent forward and established at points designated either by the division surgeon or by higher authority. These may function merely as mobile organizations or from the requirements of the situation, become fixed, in which latter case they are augmented by a "section of hospitalization." As a matter of fact, in this trench warfare, the ambulance has lost

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much of its mobile function: the fluctuations of advance and retreat have been so slight that the movement of these units as a whole has been restricted. They are located where they can best serve the entrenched troops and movement is generally confined to the transfer of personnel from one to another, leaving the work of the unit to be carried on by the succeeding force. This rotation is with the object of giving the personnel varying tours of duty with advance and further in the rear.

12. In general, the duties of the division surgeon are:

Before the Battle

1. Collect at the division combat train the ambulances and sections of hospitalization, placed at his disposal by the surgeon of the corps, in order to send them at the proper time to the designated points.

2. To establish a divisional collecting point for the wounded unless the corps commander has already done so.

3. To designate the ambulance, or unit, where the wounded shall be taken for treatment.

4. To make requisition, through the quartermaster (vaguemastre), for all available transportation for the wounded of the division and notify the corps surgeon.

5. To so apportion this transportation that it may be promptly available for evacuation in case of a retreat.

During the Battle

1. At the proper time, to notify the surgeons at the Postes de Secour and the ambulances in action of the points designated for the slightly wounded.

2. Provide medical service at this point.

3. Advise Postes de Secour of the location of the ambulances.

4. When there is opportunity, employ the division group of bearers in clearing the battlefield and make use of automobiles to transport the wounded to the ambulances.

5. Make requisition on the corps surgeon for additional transportation if needed. See that this is not unduly exposed to fire when it comes up owing to a possible change of front.

6. Make use of the personnel of units not busy to help at the ambulances.

7. Request from the corps surgeon as many of the corps bearer group as may be necessary and advise him of the nature of the terrain and the most practical routes of evacuation.

8. Keep himself posted on the general situation and send word to his superiors. In case of check or retreat, to notify the corps surgeon of the units and personnel, to be left with the non-transportable wounded.

After the Battle

To acquaint himself with the general situation: as to probable losses and as to what material must be replenished.

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2. To report to the corps surgeon and the division commander and advise them of the ambulances it will be necessary to immobilize.

3. To designate the ambulances which are to be immobilized and send to them the necessary hospital sections.

4. Notify the other ambulances to send to the above their non-transportable wounded.

5. Arrange for the collection of the wounded by the divisional group of litter bearers and assign to each group the ground it is to cover and the unit it is to deliver to.

6. Ask for the corps group if necessary and assign them to their work.

7. Ask for the necessary transportation and especially for motor transport.

8. Hasten the release of the ambulances not to be immobilized, and advise the corps surgeon of the formations necessary to replace those immobilized.

9. Take the necessary steps to replace expended personnel and matériel.

10. See that the transportation previously requisitioned is returned to the proper organizations.

11. See that the division bearer group is ready to follow in case of an advance.

The duties of the corps surgeon are in reality those of the division surgeon save that he has a larger scope and must deal in corps, rather than in division figures. He is responsible for the working of the units in his corps and is accountable to the director of sanitation of the army and also to his superior, the general commanding the corps. With the latter he is constantly in touch, ready either to furnish information or to receive orders.

13. The sanitary service has been likened to a bridge of three spans, the first reaching from the fighting line back through the zone of the rear, the second comprising the line of communication, and the third the zone of the interior. They are all important, and the fall of any span will, of course, wreck the bridge, but the second one seems of particular interest, linking as it does, the combatant force with the supplies of men and material in the interior. It is the perfect upkeep of this section that is essential to the functioning of the first line. The service of this zone of communication (Zone d'Etapes) consists of a double service, since, in addition to the service of supply from the interior, there is a constant parallel service which takes to the rear, men and material for repair.

14. Each army has its own Zone d'Etapes, which is presided over and governed by the "Directeur d'Etapes et Service," who is, theoretically, and usually, a major general. This is natural since the staff officers whom he has under him may be of the rank of brigadier general. This Directeur d'Etapes et Service is a part of the general staff of the army and is accountable to the general commanding the army. He is responsible for all the service of supply in the zone and the various staff

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corps take their tactical orders from him. That is to say, instead of the chief surgeon, for instance, going to the general for his orders, he does business with the Directeur d'Etapes et Service. The direction of all the business of this zone is in his hands and under him he has officers of the medical corps, commissary, artillery, engineers, gendarmerie, post office, telegraph, and treasury (pay corps).

While he directs the transportation in all its branches, he is not directly charged with the running of the railways. This is presided over by the director of railways who is responsible for the upkeep of this service, the running of trains and the maintenance of the service. There is between him and the Directeur d'Etapes et Service a liaison, so that, when necessary, the Directeur d'Etapes et Service can state that he needs so many trains at certain points and then it is up to the director of railways to furnish them, or to state what he can do to meet the emergency.

15. In all this service, the limits of the different zones mark the limitations of responsibility of the different officers functioning in each one. That is to say, each man has his territorial limits of responsibility and when he has received at one end that which has been sent to him and put it properly through his own territory and in the hands of the responsible officer of the next link, he is through and has no further concern in the matter. This definite limitation of the work makes the conception of duty and the performance of service a simpler and more satisfactory matter than if the boundaries of responsibility were more loosely fixed.

16. The sanitary formations which are found in the zone d'Etapes are, dividing them into groups or echelons:

First Echelon

1. The dental hospitals or ambulances.
2. The surgical automobile ambulances.
3. Reserve personnel, mobile.
4. Reserve matériel, mobile.

Second Echelon

(At Railhead)

1. Evacuation hospital section.
2. Depots for slightly wounded.
3. Temporary hospitals for non-transportable cases.
4. Reserve personnel.
5. Reserve matériel.

(At Regulating Station)

1. Evacuation hospital, and sanitary railroad trains and water convoys.
2. Depot for slightly wounded.

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3. Temporary hospitals.
4. Reserve personnel.
5. Reserve matériel.
6. Infirmeries de Gare.

In addition to the above, there is a divided interest in the supply depot, which is on the border line between the zone of the interior, and the zone of the line of communication, the one supplying it and the other drawing from it.

17. It is well to understand just what the zone of the line of communication comprises. It lies as has been said, in the zone of the armies, but it must be remembered that each army has its own zone of communication, and that, adjacent to it, is territory which, while in the zone of the armies, is under control of the grand general headquarters and not of the army at this point. The zone of the line of communication of an army begins at the back of the zone of the advance and has a definite territorial limit; back of this limit, it does extend so far as the railroad is concerned and the elements that are connected with it, but territory on either side of this railroad is presided over by a regional commander who is appointed by, and accountable to, grand general headquarters instead of the army organization.

In this way, the Directeur d'Etapes et Service has other resources at his avail, for in the regions adjacent to the zone of the line of communication, are temporary and auxiliary hospitals (the latter maintained by the Red Cross), which are available for the care of wounded. The wounded may be sent to these hospitals either by automobile section, or they may be sent by rail through some junction point on the line of communication. The authority for this diversion of the wounded from the routine channel would come from the grand general headquarters which would communicate the order to the Directeur d'Etapes et Service of the army concerned.

18. The above paragraphs show the importance of the function of the Directeur d'Etapes et Service and the fact that it is to him rather than to the army commander that the chief surgeon of the army turns; as a matter of fact, the chief surgeon of the army (Médecin de l'Armée) is a member of his staff and in the function of chief surgeon of the line of communication, takes over the direction of the technical side of this service.

I spoke in paragraph 13 of the double nature of the service rendered by the line of communication. That from the front to the rear consists principally in the distribution of the wounded and this is a sifting process, the men being either forwarded or arrested in accordance with the best interests of the service. In the service of the advance, I spoke

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of the detention of those who would soon be fit and of those who could not be moved. The same thing is true in the service of the line of communication and with the depots d'Eclopées and depots for convalescents, we have the detention points for those whom it would not be worth while to send clear back to the rear. On the other hand, at each evacuation hospital and regulating station, we have temporary hospitals which receive and care for those wounded who are not fit to continue their journey to the rear. In addition, there are the regional hospitals which may be employed for either of the two purposes as well as furnishing hospital facilities in case of extra pressure.

In the service from the rear to the front, that of supply of men of material, the salient point in the scheme is the working by echelon, so to speak. From the starting point in the interior, each officer charged with the supply service, has for his work the supplying of some unit in front of him; one that it is his duty to keep always stocked with the necessary articles or the recognized personnel. This supply is drawn against by a unit nearer the front and so things and men are, as I said, "echeloned" forward as they are needed. This simplifies the question of supply, since all that any one man has to do is to keep his stock up to normal by requisition on the depot behind him as soon as it is depleted by demands from a point nearer the advance. In looking over the scheme as outlined previously in this report, it will be observed that, at almost every point, there are reserves of both men and matériel.

19. The evacuation hospitals and the evacuation hospital sections of this zone are important units of the whole, and in them, much of the work of the zone is carried out.

The sections are at railhead, or roadhead, while the evacuation hospital proper is at the regulating station. These hospitals and sections receive, by train or other transportation, the wounded from the front and there is a classification and sifting of them carried on here. The evacuation hospital is not, in the proper sense of the term, a hospital, but in reality a clearing house, in which disposition is made of the wounded. The purely medical and surgical side of the hospital is confined to resources sufficient to meet the temporary needs of those who filter through. There is a medical personnel, both commissioned and enlisted, and sufficient matériel to do many dressings and to take care of a certain class of emergency work. There is no pretense of any permanent care and the sick and wounded are reshipped to their designated destination as promptly as possible. I have visited a number of them, and twice the section at Revigny, which latter, I believe, is a fair example of this class of service. I was told that they did not consider that they had done a full day's work unless 1,200 men

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passed through the hospital in twenty-four hours. It will be readily seen from this that the work is of the first importance, and it can be understood that good organization and attention to records and detail are essential to the proper functioning of the unit. Although the evacuation hospital or section is not calculated to care for cases formally, it has as an adjunct a temporary hospital of calculated bed capacity in close proximity, and to this the cases which cannot be shuttled further on are sent to stay until other disposition can be safely made of them. In addition to the work of the hospital, the dressing, feeding, recording and forwarding of the wounded, this unit is also charged with the personnel and matériel to outfit four improvised sanitary trains. This work of transportation is normally done by the regular sanitary trains (permanent or semi-permanent), which run regularly to the rear. They are under the orders of the Directeur d'Etapes et Service in connection with the director of railways. Theoretically, the trains of the zone of the army do not operate out of that zone; they discharge at the regulating station and there the cases are again sorted and shipped by trains of the zone of the interior to their ultimate destination. In practice, this is not the universal rule and full train loads destined to one regional center are forwarded through without the intermediate change which is a rational procedure, obviating as it does the delay and additional movement incident to a transshipment.

The trains of the army zone in the process of evacuation work, as far as possible, on a shuttle principle; that is to say, on single track routes they run on a loop, up one way to the front and down the other, giving in this way the maximum of service. In the event of any extra demand being placed on this service, or if extra service is contemplated, as in the event of an attack, the Directeur d'Etapes et Service would confer with the director of railways and state his probable needs and leave it with the latter official to see that all possible traffic on the roads was made available. It might appear from this that there is a divided responsibility between the Directeur d'Etapes et Service and the director of railways, but when it is considered that the running of a railway system is a one-man job, it will be understood that the functioning of this service belongs distinctly to an officer who devotes his whole time to it. He is responsible for the running of the service, the upkeep, the supply of rolling stock, and the Directeur d'Etapes et Service makes demand on him for transportation as he requires it and directs the running of the trains so far as their destination goes. Naturally, the condition which throws the greatest strain on this service is that of a surprise attack. In this event, there can be no prevision, and organization and improvisation must be promptly carried out.

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20. In regard to the regional divisions, previously referred to, France and French territory abroad is divided into territorial regions, each of which is under a regional commander. There are twenty-one of these regions, Nos. 1 to 18, 20 and 21 being in France and 19 in Morocco and Algiers.

The interest in these regions, from a sanitary point of view, lies in the fact that preparation is made in them in time of peace for the needs of the nation at war. Certain hospitals, temporary (under entire military control) and auxiliary (organized by the aid societies) are established in each of them and made ready to function in case of necessity.

This work is under the supervision of the regional commander, and he is responsible to the central authorities at Paris for the proper execution of this preparation. In this manner, the government has at its disposal a number of institutions available for the distribution of the wounded in addition to the strictly army units. Those in the zone of the armies are under the orders of the grand general headquarters while those in the zone of the interior are accountable to the ministerial government. From this it can be seen that the authority of the Directeur d'Etapes et Service runs *through* these regions on the line of communication (rail or road), and is absolute in the units attached, such as the regulating station group, but is limited by the territory on either side, which is regional, and under the authority of the armies and not the army. The regional commander, who is a general officer, has his medical staff, which is intrusted with the maintenance and general supervision of the hospitals pertaining to that particular region.

21. These regions are further subdivided for purposes of more practical administration, into "centers." A "center" comprises, generally, a temporary hospital, and a group of varying number of auxiliary hospitals which are more or less under the direction of the first named. The Médecin Chef of the temporary hospital is a medical officer of experience and has a more complete staff than the others. It is here that the major operative work is done, and the others serve either to take care of the less serious cases or to keep and care for those who are convalescent after operation. It is the duty of the Médecin Chef of the center to apportion to the institutions under him the cases which arrive at the distributing center. This distribution is not made *numerically* by him, for that is a question decided by the grand general headquarters, who are informed of vacant bed capacity in the hospitals of the region and send word of the apportionment so far as numbers go. The actual sifting of the case is his province and he decided as to which are to be taken directly to the temporary hospital and which are proper

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to send to the others until he has disposed of the entire number forwarded to him.

22. It is not easy to give an exact idea of the number of troops which are on the French front today. This is a changing quantity and varies according to conditions and circumstances. I presume that there are at present in the front lines about . . . divisions, and, taking that as a basis, it is not hard to estimate the number of sanitary troops, since there is a definite divisional ratio. The French have of late been attaching more importance to the division as a tactical unit; more so than to the corps. In fact, I am informed that in one of the armies today, there is no corps formation, the division making the working unit. This has resulted in a breaking up of the attached units of the corps, the train, etc., and their distribution throughout the division. Whether this has gone as far as the sanitary troops or not, I do not know, but I think it likely since, with the abolition of the corps trains, the normal place for them would no longer exist.

23. From what I have written, it may be seen that the sanitary organization corresponds with the general division of military service, and that it follows the same general lines.

We have the two general services, that of the armies and that of the interior, the first functioning with the active troops and the latter as on a peace basis and having for its main function the support and supply of the service of the front.

24. The service of the front is again divided into that of the advance and that of the rear, which embraces the service of the line of communication. The sanitary service of each of these delimited areas is governed by the one in which it functions, and consists, for the zone of the advance of the organizations which are attached to the fighting forces. That is to say, the sanitary force of this zone ends with the limit of the corps, or of the divisions if the corps happen to be abolished. The service of the zone of the rear and of the line of communication consists of the units which are not directly attached to troops, but which belong to the army. Carrying this general division in mind, it is not hard to follow the working of the various units in regard to one another. Authority is definitely limited and passes from one to the other as the limits of the zones are passed.

MOBILIZATION

25. It will be interesting, I think, to follow in a general way the measures which are put in operation when the country passes from a state of peace to that of war by mobilization.

The different regiments have their depots, which are established

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in time of peace and these are the assembling places of those who, by the order of mobilization, are called into active service. Compulsory service has, of course, left all men of military age with definite ideas of the part which they will be called on to play if needed for national defense. Each man who has finished his military service has his "carnet de route" or individual book in which are entered the necessary data. This is his travel order and transfer card.

26. The mobilization orders are prepared in time of peace and numbers of them stored in the different barracks of the gendarmerie national and, upon the call for mobilization, they are posted throughout the entire country at the same time by the local bodies of this organization.

From this order each man of a town or village learns his depot and the date of mobilization. The day of mobilization begins at one minute after midnight and ends one minute before midnight of the day following. Within that time, all those covered by the mobilization order are required to have presented themselves at the designated depot.

27. The regular, active army is, of course, in a state of preparedness, and the reserves who are called out are formed into regiments in accordance with the plans of the government, equipped and sent to designated points. The auxiliary troops are forwarded in accordance with the same general scheme. The officers of the sanitary service have their orders as other officers have, and they repair to the designated regiments. The sanitary units are formed according to preconceived plans and forwarded as completed units from the depots at which they are assembled.

28. As far as enlisted personnel goes, in peace time this force is trained in the various schools and at the maneuvers and is divided into . . . groups situated in different parts of the republic, known as "sections of infirmiers." It is from these different sections that the individual units are constructed for the active service. They are not entirely depleted, however, but some of the trained men kept as a nucleus for the fresh detachments that must be built up. In this way, trained and equipped detachments are promptly forwarded to the places needed; they go as equipped organizations; ready so far as personal clothing, equipment and rations are concerned, for immediate service. These detachments, which are made up from the "sections of infirmiers" are classed under two headings: as principal detachments (two classes of these, dependent on whether they belong to the service of the advance or rear) and special detachments.

The difference is that the principal detachment functions as a unit, say in the manning of an ambulance, group of litter bearers, etc., and

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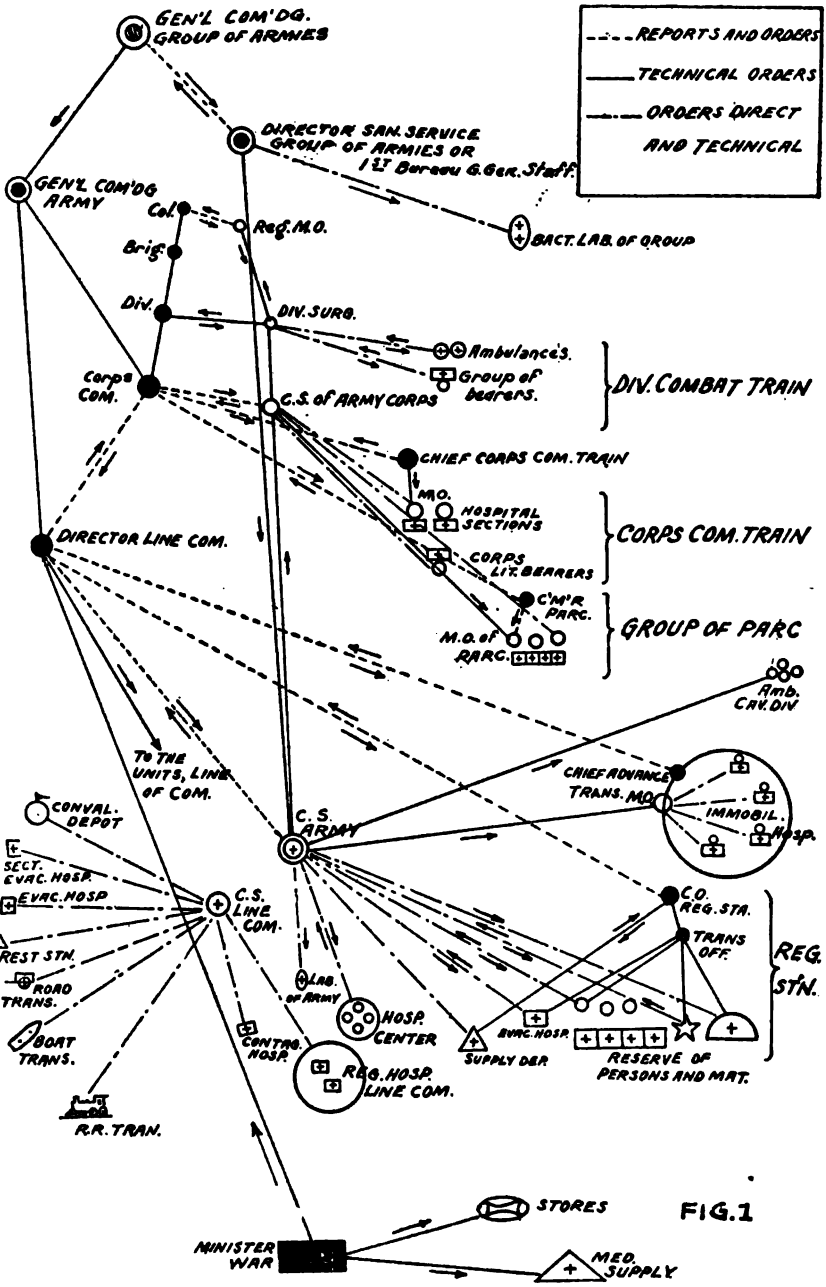

FIG. 1

DIAGRAM.—SANITARY SERVICE FRENCH ARMY.

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the special detachments are fractions of the larger group which are used where there is not need for so great a number of men.

The responsibility and "channels" for administrative business of these different units are in conformity to their constitution. That is to say, the commissioned officers of a special detachment communicates with the commissioned officers of the principal detachment, and they in turn with the commissioned officers of the section of infirmiers from which they sprung. This, in a measure, centralizes paper work and control in the territory of one army.

THE DIRECTOR-GENERAL OF THE ROYAL ARMY MEDICAL SERVICE AND THE ARMY COUNCIL

Lord Esher, in a letter to the *Times*, has warmly advocated inclusion in the Army Council of the Director-General of the Army Medical Service, and this would be a step which all medical men would recognize to be in the right direction. No one wishes to encumber the Army Council with too many representatives, but the progress of this war has shown us over and over again that it is difficult for a military officer to perceive the difficulties which must arise in a specialized and technical department. Yet unless the difficulties are perceived the remedies cannot be arrived at. The bestowal by the King on Sir Alfred Keogh of the high distinction of the Grand Cross of the Bath is a public acknowledgment of the way in which the Royal Army Medical Corps, supported from the outset by the efforts of the medical profession as a whole, has discharged its onerous work, and Lord Esher's appeal to the Secretary of State for War further to recognize this work by admitting the Director-General of the Army Medical Service to the Army Council is a very just piece of argument.—The *Lancet*, February 10, 1917.

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EDITORIAL

AGAIN THE CALL

With the coming of war, vast problems of recruitment, organization, training, equipment and supply confront the Medical Department.

As a preliminary opportunity to prepare for these problems and learn better how to meet and master their difficulties, the recent mobilization on the Mexican border has been of great practical value. It has shown the existence of certain defects of system and the measures necessary to their remedy. It has demonstrated whatever difficulties there were in the way of supply and how these might be minimized or avoided. Any deficiencies of training have been laid bare, and methods for improvement indicated. All these and other matters were handled at relative leisure and in advance of any great emergency, and gave opportunity for unhurried taking of stock of the faults and virtues inherent in the present conditions within the Medical Department. It is the general conclusion that the faults so demonstrated were few—the virtues many.

But now the great emergency has arisen in which there must be applied, without delay, the lessons learned. War on a scale almost inconceivable confronts us. The affair of the Spanish War becomes relatively an episode. The obligations of the Civil War, great as they were, are now again imposed, but in tripled or quadrupled magnitude. The day has come for which, through long years of peace, we have been preparing. It demands of us, in behalf of the nation and cause of humanity, the expenditure of thought and energy to the limit of human capacity. Fortunate are they who, through the doubts and obscurities of peace, have kept their vision fixed on the fundamental truth that armies are maintained for war; and that war training, not peace efficiency, is paramount. To such will fall the inestimable privilege of being able to render services of the greatest value to the country, in the present day of stress and peril.

Aside from its other tasks, perhaps the greatest and most immediate burden which now falls upon the Medical Department is that of training the sanitary personnel which is rallying around the colors. The "first million" force will call for over 7,000 medical officers and approximately 100,000 soldiers of the Medical Department to meet its sanitary needs. We are faced with the necessity of training the equivalent of a brigade of doctors. The Surgeon General of the Army will be the immediate commander of a sanitary force as large, by itself alone, as the entire mobile army of the United States at the time of the declara-

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tion of war. These men must be taught their duties, not only to perform them themselves but to teach others, and their officers must be taught not only the functions which fall to medical officers as such, but how to train their subordinate enlisted personnel in the more elementary work of the latter. The officers must be made conversant with every phase of medico-military activity. The task is stupendous, but it must be and it will be accomplished.

The Medical Department has a proud record to sustain. Within the past decades especially its strides in efficiency, in every branch of its work, have been tremendous. With every step toward field efficiency and war preparedness which it has taken, often against open or passive opposition by those of narrow vision outside its own ranks, it has advanced in usefulness. The Army as a whole has come to realize its value and efficiency. Among the people at large the name of the Army Medical Department has become synonymous with energy, ability and progress.

Great things are expected of the Medical Department. God helping, and reinforced by the able and patriotic doctors who are answering the summons from civil life, it will not fail.

E. L. M.

THEN AND NOW

We are told that history is philosophy teaching by example and, pondering this definition, we wonder if our present national state of mind is such that experience or example will be accepted as teachers, or will we again run after strange gods, the evolution of the vain imaginings of those without experience and heedless of example?

The beginning of the Spanish-American war found us wholly unprepared, entirely without a military policy, and with no provision beyond that required by the small permanent force whose function was that of a frontier police. The time is too recent for us to forget that we had not more than enough shells to fire a single round from the guns mounted in our various fortifications; that we had only enough modern rifles to arm the little body of regulars and just sufficient smokeless powder for them. Everybody over thirty years of age will recall that the 71st N. Y. Infantry, armed with the old Springfield rifle firing black powder cartridges, because of the smoke which revealed its position, not only invited its own destruction but became a real menace to the integrity of the entire line at Santiago. Field artillery firing black powder there also furnished a fair mark to the enemy, and because of it was virtually useless. A thousand things there were wrong and very little right, except the stout hearts of the good old soldiers.

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These did their duty and died, after winning the war. Their comrades of the camps died too. Not in the fierce charge or stubborn retreat, but in rotten, ill-managed bivouacs, immobilized in their own infectious filth.

Our President then postponed, even as our President now was forced to postpone, the fateful declaration of war, because he knew we were not ready. But the people demanded action, no matter the cost and—they paid the bill.

The story of the confusion which took possession of the War Department at that time would be humorous, were not its results pathetic. In every direction chaos reigned; the populace filled the halls and crowded the offices, every man with a scheme evolved from his own inner consciousness; for each knew that the War Department had no policy and no plans—and each thought his own plan a revelation. It was—mostly of ignorance and impracticability.

Congress formulated and passed a law authorizing and prescribing the organization of a volunteer army. We will here confine further remarks to the Medical Department.

Upon the declaration of war, two officers of the Medical Corps who had given much thought, study and work to the organization of the sanitary service in war, were ordered to Washington to prepare, in the very face of hostilities, a scheme of organization for the front. This, or any like scheme, necessarily involved, primarily, personnel. Now Congress had forgotten to provide for a hospital corps. The law allowed a certain number of corps, division, brigade and regimental surgeons, some hospital stewards and nothing more. In the memorandum prepared by the medical officers aforesaid, a hospital corps formed an essential element. So when the number needed and their disposition was determined upon, the senior officer went to the military committees of Congress, explained the situation and asked that a hospital corps be provided. Nor could there be any delay, as even then the volunteers were mobilizing.

"What is this hospital corps and how many men do you need?" asked the committee. The officer defined the duties of the corps and said that all experience indicated that a personnel equal to at least 4 per cent of the fighting effective would be required for the hospital corps. "How many would that be?" asked the chairman. The officer replied, "You are authorizing 250,000 volunteers, and for this number there should be 10,000 hospital corps." "What!" replied the chairman, "a whole division! That's ridiculous! Do you suppose we could go to our constituents and confess that we had passed a law

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authorizing the enlistment of 10,000 men to look after the sick? We will do no such thing." The officer, much perturbed, returned for consultation with his colleague. After considering various ways around, it was decided that there was but one thing to do and that was to take advantage of the liberally drawn law organizing the hospital corps of the regular army, which authorized the Secretary of War to enlist as many men in this corps as necessary, get Congress to take off the limitations as to noncommissioned officers, and permit the transfer *vi et armis* of a certain number of men from the volunteers, directly into the regular Hospital Corps. This the committees agreed to, the law was amended as to non-commissioned officers, and G. O. 58, Hdqrs. of the Army, A. G. O., May 31, 1898, was issued. This is how it happened that volunteers were transferred to the regular army, often against their will, sometimes without their knowledge and almost inevitably with inefficiency and inadequacy of number, that added to the burden of the already overburdened Medical Department.

The Volunteer Army law had other serious defects, among them being the appointment to an office in the Medical Department, rather than a grade, from which suitable details might be made. For example, a number of very good physicians were appointed from civil life as Corps, Division and Brigade Surgeons. We may safely say that not one of them had the most remote idea of the duties of these offices, which were purely administrative. Notwithstanding this fact they, with very few exceptions, demanded to be assigned to these offices and resented assigment to the immediate care of the sick, which duty alone they were qualified to perform. Need we add that there were some remarkable exceptions, of which Colonel La Garde[1] speaks. But these were none too many.

The scramble for the superior offices, by those who by no stretch of imagination were qualified to fill them, was a sight to behold, and they got them too.

At this time there were no reserve medical supplies and realizing that medicines, etc., would be needed immediately upon mobilization, a telegram was prepared addressed to the governors of the respective States notifying them of this fact and requesting that they send their troops to camp with at least a six-weeks supply of medical material, for which the State would be reimbursed. Shortly therafter one of the officers happened to be in a certain camp and met, marching in, a fine regiment of volunteers. He sought out the surgeon, who proved to be an excellent man of the family physician type. After exchanging greetings the surgeon told him that he didn't "know much about soldiering but

[1] THE MILITARY SURGEON, p. 512.

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the boys were almost all his patients and their mothers didn't want them to go without him." During the conversation, the officer noticed that he was holding tightly under his arm a small package rolled up in newspaper. So solicitous did he seem concerning it, that finally the officer remarked to him that it must be something valuable, whereupon the surgeon replied, "Yes! these are my regimental medical supplies," and, unrolling the package, he displayed a batch containing 500 five-grain quinine pills. This constituted the entire *armamentarium medicorum*. Needless to say that regiment was without medical supplies for many weeks and many of its men died from preventable causes. A peep behind the curtain would reveal not a few such experiences during the Spanish affair, some of them humorous, some grave, some disastrous. Shall we content ourselves with the national slogan "We got there just the same," or shall we heed the example?

During the last fifteen years a continuing effort has been made by succeeding administrations to formulate a military policy, and it may safely be admitted, in the language of the Director General of the British Medical Corps when speaking of his service, that, "with the advent of the General Staff, adequate and systematic preparation for war became possible." Let us hope that we will be able to add with him, "A deliberate, considered and definite plan was formulated; finicking conditions were set aside and real and earnest work succeeded the trivialities of the immediate preceding years."

The law to provide for raising the volunteer forces of the United States approved April 25, 1914, is "deliberate, considered and definite," as far as it goes, and if administered in accordance with its spirit will furnish an efficient sanitary organization. But will it be?

With the raising of another volunteer army there will appear again those who ignorantly "rushing in where angels fear to tread" will demand high office and, if their "pull" is strong enough, may get it; unless the people step in and command that such things must not be.

If, in spite of a century's experience, Congress still insists upon the undemocratic volunteer system, nevertheless in the beginning we should put the entire responsibility of the organization upon the tried officers who have served the Republic for years, training to meet the contingency of war. Don't let us handicap their administration by those who have not so trained, and are not administrators; for when the inevitable break comes under such handicap, the worthy are unjustly blamed and the unworthy often escape, but the Government loses in any event. Then, should the war continue, the fittest will survive and new and real leaders will develop from among the temporary as well as permanent medical officers.

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WE TAP THE MOTHER LODE OF INFORMATION

With the declaration of war the key has been turned back in the lock which held fast a vast amount of most valuable and timely medico-military information, officially but confidentially received from foreign sources.

The Army War College, which has accumulated this information, is compelled no longer to act as its guardian and is now endeavoring to disseminate it to the best advantage of the service and country. In pursuance of its new policy, it has made THE MILITARY SURGEON, along with other service journals, its mouthpiece in all matters relating to the special branches of the forces whose interest it serves.

THE MILITARY SURGEON will largely devote itself in the immediate future, even to the possible delay in publication of local articles of less pressing importance, to an exposition of conditions reported from the great war abroad and of the practical lessons to be learned from them for application to our own service, and promises our members a series of articles, extracts and abstracts, as valuable as they are unique.

A still broader field of usefulness of immediate, direct and practical value has thus been opened to us. We feel that the compliment implied in the making of THE MILITARY SURGEON the official exponent of the national center of military plan and thought, to the medical profession of the country, is one in which we all may well take pride. With it comes the moral obligation of every member—nay, the patriotic duty—to impress upon every person who is eligible to join us, the great educational advantage of enrolling himself at once on the roster of the Association of Military Surgeons.

E. L. M.

THE ASSOCIATE EDITOR

The Association is more than fortunate in securing the consent of Col. John Van R. Hoff, M. C., U. S. Army, retired, to undertake the duties of the recently created position of Associate Editor, to which office he has been appointed by the Executive Council.

Colonel Hoff needs no introduction to our membership. A former president of the Association, he has long given its interests his keenest sympathy and strongest support. It was he who with far-reaching vision, when president, established THE MILITARY SURGEON as the monthly medium of the Association, in lieu of the former annual volume of proceedings, and at the same time brought about the incorporation by Congress, as a national association, of our society.

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As an officer of the Army, Colonel Hoff has for more than a generation stood as the exponent of every high ideal and honorable purpose for his corps and the allied services.

Since July last he has, without material reward, conducted the office of secretary and the editorship of THE MILITARY SURGEON, to the sacrifice of self-advantage and a well-earned rest, believing that in this way he could accomplish more for his profession, service and country than in any other manner. To his zeal and ability in these functions a steady enlargement of the membership roll of the Association and a bigger, better, and brighter MILITARY SURGEON give testimony.

In the hands of our Associate Editor the interests of the Association are well safeguarded. E. L. M.

THE CIVIL PROFESSION AND THE SOLDIER LIFE

Now that we are about to cross the track, would it not be well to "stop, look and listen," lest we meet disaster?

The country, we hope, is about to adopt the only truly democratic plan of national defense, a plan in which every fit man must serve fittingly. This means universal military training of a quality to make real soldiers and has equal application to medical men *in esse aut posse*, as to those, in Kipling's words, "of lesser breeds."

The question naturally arises; Is this training to be different for the possible medical officer to that for the others? Experience of other nations would indicate that such should be the case, that certain modifications of the general training scheme must be made. It is observed, however, that no nation omits a tincture of the ranks from any class, every man must feel the touch of elbow and learn to obey, before he can learn to command.

It is quite possible that we will compromise upon a summer of intensive training in a purely military direction, and thereafter those who are matriculants of medical schools will be permitted to continue their medico-military training in their schools under well-defined and enforced regulations. Doubtless this special military training, *mutatis mutandis*, will be extended to other professional schools as well, and of course will cover the full period of a year, if the law demands a year.

Exactly what form this training in the medical schools will take is, of course, yet in the lap of the gods, but one thing we may be sure of is that it should be efficient, that it should teach only those things that pertain to the duties of the medical officer, and that it should not lose motion by in anywise trenching upon the work of the other professional chairs.

Just now the medical schools have generously offered to add to their curricula a course in the duties of the medical officer and such courses

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are actually being given, but are necessarily temporary, experimental and calculated to do little more than bring to the more or less distracted attention of the senior medical students, the fact that the military medical officer is a specialist and his specialty must be learned, if it is to be successfully practiced.

The interesting discussion of this subject in the able papers by Colonel Borden, a distinguished retired medical officer of our Army, now Dean of the Medical School of George Washington University, and 1st Lieut. Loyd Thompson, M. R. C., published herein, is a valuable contribution to a matter of importance to the country and profession and should evoke further comment. To be sure universal service would necessarily change the point of view and *réson* for their papers, since all physicians would then be in the reserve; but it would not change what seems to be a very practicable method of recruiting the permanent medical services.

WHAT ARE WE GOING TO DO ABOUT IT?

It goes without saying that the winning of a diploma in medicine does not necessarily constitute one an efficient practitioner of any of the several recognized specialties of the profession; it is evidence of the possession of an approved foundation for such, it is the starting point from which special knowledge may be gained, but beyond that nothing. To attain recognized rank as a specialist demands, in addition, ability, application and achievement in the special art to which the physician has elected to devote himself.

So it is with the medico-military art; its practitioner is not born such, nor does his diploma in medicine make him such; he is made through ability, effort and training quite equal to that of any other medical specialist.

Granted this, what must be done to induct the 10,000 physicians who are about to undertake the practice of the specialty of the military medical officer, into some efficient knowledge of this work? And to accomplish it in the least possible time?

In military parlance—and this is the language that our recruits must learn before they can get at the true inwardness of the military art—we have the equivalent of two brigades of recruits, prospective officers for 100,000 sanitary soldiers more or less, to get into shape with the least possible delay.

To train such a number of recruits for the various branches of the service requires 306 officers and 1,074 noncommissioned officers, as shown by the tables of organization. This is leaving out of consideration the leaven of trained privates who are so great a help in forming new organizations, because we have them not.

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We find that the Medical Department at the present time may possibly be able to supply a third of the minimum number necessary to the efficient training of its recruit officers; not nearly enough, but all we have.

What then should be done to get the best results the means will permit? First, send all the newly appointed medical officers into camp with the other recruit officers and put them through, as members of a common organization, a month's intensive training in the elements of soldiering under line officers. This training would give the medical men a point of view quite necessary for them to have, would teach them obedience to orders, discipline and the customs of military life as nothing else could—for such training is the boiled-down experience of the ages and the only way to make soldiers.

But why need medical officers be soldiers? Simply because, among other things, they in their turn will have 100,000 sanitary soldiers to teach and command.

Second, upon the completion of the month's purely military training, the survivors, for not a few will fall by the wayside, should be put under medical officers, into the training pertaining to their special work. Of course, here again our greatest lack will be trained instructors, so, as far as possible, our recruits must teach each other.

It need not be said that this huge mass of 10,000 individuals must have subdivisions, as other military bodies, if it is to be handled at all; and these subdivisions must have leaders. As with the Israelites of old, there must be captains of tens, of fifties, of hundreds and thousands; in a word, the sanitary troops must be divided into provisional regiments, battalions and companies.

It may be assumed that the training schools, which it would be desirable to organize for special training, should be limited to a maximum of 2,000 student officers. These schools should be established at four large military posts, the students housed in barracks, and an intensive course of special training instituted to cover two or possibly three months.

A curriculum has been devised which would furnish an excellent basis upon which to found the course, which would develop as it progressed.

The plan here outlined appears to be the quickest and most efficient way to round into shape the thousands of physicians who are glad to serve the country, but who, before that service can be thoroughly efficient, must be inducted into the mysteries of military life, so that they in turn can induct therein the scores of thousands, their assistants, who constitute the rank and file of the sanitary troops.

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COMMENT AND CRITICISM

A PLAN FOR CREATING AN ADEQUATE MEDICAL RESERVE FOR THE ARMY

That the Medical Department of the Army was woefully unprepared in 1898 is denied by none. That it was well prepared in 1916 is admitted by all. And it is also admitted that at least a part of this preparedness in 1916 was due to the Medical Reserve Corps.

This adjunct to the Army was formed by Act of Congress, April 23, 1908, and in the language of the Act, "was for the purpose of securing a reserve corps of medical officers available for military service."

The President was authorized to issue commissions as first lieutenants to medical men who were found qualified upon physical and mental examinations, and recommended by the Surgeon General.

The Secretary of War was authorized in emergencies to call into active service such officers of the Medical Reserve Corps as were necessary, provided they were willing to accept such duty. When called into active service, the commissions of the officers in the Medical Reserve Corps, conferred upon the holders all the authority, rights and privileges of commissioned officers of like grade in the Medical Corps of the Army, except promotion. They were subject to the same laws, regulations and orders, and received the same pay and allowances.

In spite of these few inducements, there were attracted to the Corps, largely through motives of patriotism, more than two thousand high class medical men, some of them among the most distinguished in America. In 1915 a four-years correspondence course for officers of the Medical Reserve Corps, which was optional, was inaugurated.

When the call to duty came, there was a prompt response from the officers of the Medical Reserve Corps, many of them answering the call at no small personal sacrifice, and during the summer of 1916, approximately six hundred accepted active service. In January, 1917, there were still three hundred and eighty officers of the Medical Reserve Corps on active duty. Even with this enviable record, the Medical Reserve Corps is thought to be inadequate, and on June 3, 1917, will cease to exist.

In its place there will be the Medical Section of the Officers' Reserve Corps. All officers of the present Medical Reserve Corps are eligible for commission in the Officer's Reserve Corps, without re-examination, except physical; or they may be honorably discharged from the service.

The main points of difference between the Medical Reserve Corps

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and the Medical Section of the Officers' Reserve Corps are that the officers of the latter are commissioned for a period of five years instead of indefinitely; that in time of war they may be ordered into active service, even without their consent; that there is provision for increase in rank, up to and including the grade of major; that they are required to participate in correspondence courses of study, and that those in the grade of first lieutenant will be subject to orders for a fifteen-day period of instruction each year.

Certainly this is a step in advance, and probably, if the matter is brought to the knowledge of the young medical men of the country, both before and after graduation, quite a large number will see fit to apply for commissions. But will they be adequately trained? Will the correspondence courses, and the fifteen days of instruction each year for the first lieutenant, be sufficient for their military-medical education? I think not. Some other and more adequate method must be found.

In order to secure a sufficient number of good men for Medical Reserve, who are prepared in the special requirements for military duty, the service must be made more attractive. In short, it must be shown that accepting commission in the reserve will be of decided advantage to a man.

It is with the object in view of supplying the government in time of need with an adequate reserve of medical officers, not only well trained as physicians, but also trained in the special duties of medical officers, that the following plan is proposed:

In the first place, it is as much the duty of the government to train its medical officers as it is to train its other army officers. Certainly the technical knowledge of the modern physician is as great and as complex as that of the officers of any other branch of the service. It is therefore highly desirable that a modern medical school should be established with the sole object of training physicians from the beginning of their medical course, for their future usefulness as medical officers of the army.

These men should be appointed by competitive examinations, they should be under strict military discipline as are the West Point Cadets, and they should receive pay from the time of their appointment and entrance on their scholastic duties.

The advantages to the service of such a plan are obvious, and should receive the support of all who have the good of the regular Medical Corps at heart. However, this is somewhat foreign to the issue, as this paper proposes to deal with the raising of an adequate medical reserve.

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There are in this country, in round numbers, seventy-five medical schools of Class A and Class B grade. To each of these schools should be detailed an officer of the regular Medical Corps to give instruction in Military Hygiene and Military Medicine, which should be made a compulsory part of the curriculum. By this method, all graduates in medicine would have at least a working knowledge of the duties of a military physician. Upon graduation, the five ranking men of each class from these schools, who so elected, should be given commissions as second lieutenants in the medical section of the Officers' Reserve Corps. They should be given interneships in the hospitals of the schools, and during their terms of service as internes they should receive, from the medical officer detailed to the schools, post-graduate instruction in Medical Department administration, including the duties of medical officers and customs of the service, sanitary tactics, etc. During this term they should receive pay at the rate of $25.00 per month.

At the termination of their terms of serving as internes, they should be given three months' service with troops with the pay of their rank. After this service, and upon passing satisfactory examinations, they should be commissioned as first lieutenants and relieved from active duty. They should, however, be subject to call in time of war or threatened hostilities, and in time of peace for a period of fifteen days of each year for five years, they should be under orders at training camps for instruction. It will be seen that this method would provide three hundred and seventy-five fairly well-trained medical officers each year, or nearly four thousand in ten years, who would form the first line of reserve in case of war. At the end of five years, upon passing satisfactory examinations, these officers should be commissioned as captains.

The work up to the time of being commissioned captain should be made compulsory; that is, after a man has once accepted the commission of second lieutenant, he should be required to continue in the service until he attains the rank of captain, or unless he becomes physically disqualified in the meantime. After this, if he elects to continue with the work, *i. e.*, to attend camps of instruction during the next succeeding five years, and then passes a satisfactory examination, he should be commissioned as major.

Provision should also be made for the appointment of men to the grades of lieutenant colonel and colonel. Such appointments should be based upon aptitude for the service, and upon the degree of eminence attained by the individual in civil practice.

In regard to the present Medical Reserve Corps, or, as it will be styled after the third of next June, the Medical Section of the Officers' Reserve Corps, provision should be made to give those officers who have

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not had active duty, three months' service and then the same plan should be followed with them as outlined above.

LOYD THOMPSON,
1st Lieut. M. R. C., U. S. A.

SUGGESTIONS FOR CORRELATING THE MEDICAL SCHOOLS OF THE COUNTRY WITH THE MILITARY, NAVAL, AND PUBLIC HEALTH SERVICES OF THE UNITED STATES

In organizing national resources for national preparedness and defense, it is essential: (1) that there be resources; (2) that these resources be of right quality and quantity; (3) that these resources be available. The consumer, *i. e.*, the war material user, must be put in direct authoritative touch with the manufacturer, *i. e.*, the war material maker. For efficiency, the consumer must know that the materials he desires are properly made and that he can get enough of the output and get it promptly when required. Equally, it is necessary that the producer have the incentive to establish and maintain an adequate plant and so turn out standard products.

In the medical services of the Army, Navy, and Public Health Service, the consumers are the regular and the reserve corps of the services and the material consumed by them is manufactured by the medical schools of the country. To obtain efficiency in supplying these services they should (1) determine that the medical schools furnishing their material are efficient; (2) obtain the material with no unnecessary red tape; (3) offer such inducements to the schools and their students as will stimulate them to highest efficiency.

It is recognized (1) that the Regular Medical Corps of the Army, Navy, and Public Health Service should be filled by capable graduates in medicine; (2) that the *special* medico-military and public health training of the permanent men of these services must be given in the service schools and by practice in the services; (3) that a large reserve of medical men available for military service and naval service in time of war is necessary; (4) that this reserve, to be effective, must be trained in the basic essentials of medico-military service; (5) that the Navy has difficulty in finding a sufficient number of medical men to fill its regular corps; (6) that the army will probably have difficulty in filling its Reserve Corps; (7) that the medical corps of the Army, Navy, and Public Health Service are necessary to national defense and that every effort should be made to fill and maintain a large and efficient corps for each; (8) that neither the Army, Navy, or Public Health Services are now correlated with the medical schools which furnish them with their personnel; (9) that aside from the inducements offered by the

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services to the graduates of medical schools, which inducements are not by any means adequately presented to students at the present time, the services do not offer any inducements to the medical schools to strive for betterment of their products.

In order to rectify the above indicated non-correlation of the medical schools of the United States with the Army, the Navy, and the Public Health Services, the following is suggested. The medical schools of the United States which apply to the services for instruction in medico-military and public health subjects, should be inspected by officers detailed from the services for this purpose and if found satisfactory in: (*a*) premedical educational requirements and their enforcements; (*b*) adequacy of equipment; (*c*) efficient use of the same, they should be put upon *accredited* lists by the Secretary of War, the Secretary of the Navy, and the Secretary of the Treasury, and be provided with instructors by them for, say, sixteen hours annually in the fourth year, who shall instruct the students and annually inspect the schools to determine if they maintain their efficiency and should be continued on the accredited list.

In addition to the method of appointment by examination to the Reserve Corps, leading to instruction at the service schools, and final examination for commission in the regular medical corps of the Army and Navy, and the method of examination for commission in the Public Health Service now in vogue; *a second method, by direct appointment to the services, without examination, of selected candidates from medical schools which are on the accredited lists, should be instituted.*

To carry out this additional method of appointment, it is suggested that any student in an accredited school who obtains a general average in his four years of study of 85 per cent or more, who passes a physical examination by the Medical, or Naval, or Public Health Service instructor appointed to the school, and is recommended by the faculty and approved by the instructor, be appointed direct to the Reserve Corps of the Army and Navy and, after the satisfactory completion of a year's hospital service, be reexamined physically and, if still physically sound, be sent for instruction and final examination at the Army or Navy School, or directly commissioned in the Public Health Service, whichever service the student may elect. In emergency, the year's hospital service could be omitted, and "approved" candidates sent direct to the service schools.

The instruction given in the accredited schools by the Army, Navy, and Public Health Service instructors should be according to outlines determined upon both as to time and quality. These outlines should be revised from time to time as required and should be strictly

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adhered to, otherwise irregularity of instruction and inefficiency will result. The course should be made obligatory in all accredited schools, a final examination should be given at the end of the course by the Army, Navy or Public Health Service instructor, and the marks obtained by the student should count for or against his obtaining his degree. All the examination papers of the student should be used by the instructor to determine the student's English (grammar, punctuation, spelling), and grasp of subject (mental training), as is done by the examiners in the present examination method of appointment.

In this connection it would seem that the establishment of a Public Health Service School on the same lines as the already established Army Medical School and the Naval Medical School; or, as the Public Health Service merges with the Navy in the time of War, it might be well to have a combined Naval and Public Health Service Medical School. The establishment of such a school would enable the Public Health Service to instruct both "examined" and "appointed" candidates in this school, and their qualification for commission could there be determined, as well as their relative rank.

The relative rank of all candidates, whether admitted to the service schools by "appointment" or examination, should be exclusively determined by their standing in the service schools.

THE RESERVE CORPS OF THE ARMY AND NAVY to be effective must be—(1) large; (2) steadily added to by new material; (3) must be instructed. To obtain size: (*a*) make admission to the Reserve Corps as little difficult as is possible and necessary; (*b*) encourage entrance of young men who have something to strive for and when they are in their formative stage (final year of student life). To obtain new material, the desirability of entrance to the Reserve Corps must be annually placed before students before their graduation.

In *addition* to the examination method now in vogue for admission to the Reserve Corps of the Army and Navy a method by *direct* appointment should be instituted. This additional method should conform to the second method for admission to the Regular Corps, in so far that it is suggested that any fourth year student of an accredited school, who passes the physical examination given by the Army or Navy inspector, who qualifies for graduation in the school, is *recommended* both by the *faculty* and the *medical instructor* and who pledges himself to the obligation of the Reserve Corps should at once be recommended for a commission in the corps when graduated.

The obligated commissioned men of the Reserve Corps should be trained after graduation by correspondence and in training camps.

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The sixteen or thirty-two hours of instruction in the medical school should be considered as stimulative only, for it cannot be sufficient, effective, or final.

It is submitted that the above tentative outline contains a practical way of correlating the medical schools of the country with the Military, the Naval and the Public Health Services of the country. It will bring adequate medical schools directly in touch with the services, will insure the obtaining of both Regular and Reserve Corps Officers of high grade from the schools, and will give the students of the schools something to stimulate them to better work.

It is believed that a method by which approved graduates may be recommended for appointment to the Service Schools will insure more carefully selected candidates than does the method by examination now in vogue.

In the method of selection by examination, a candidate's qualifications are determined by (*a*) physical examination; (*b*) certificate of character; (*c*) perusal of the candidate's written examination papers, by which are determined the candidate's professional qualifications and an estimate is made of his general education, as shown by the construction of his paper in regard to grammar, spelling, punctuation and general presentation of the subject of which he is writing.

Certificates of character are easily secured, and in the examination method there is no personal observation of the candidate by which even an inkling can be had of his characteristics and adaptability for the service.

In the suggested method by appointment, physical examination and certificates of character are required as in the examination method. In addition to this, a member of the regular corps personally interviews each of the candidates, inspects their written examination papers and so determines the same facts as are determined by inspection of the papers in the examination method; he can inquire into and examine the candidate's premedical and medical educational attainments and after conference with the dean of the medical school and the faculty, who have had the candidate under observation for several years, can recommend or disapprove the candidate's application. The method by appointment places a direct responsibility upon the faculties of reputable medical schools and the inspecting and instructing officer, and the officer, after personal and careful investigation in each case, has full authority to accept or reject any candidate and in this way should be able to recommend the appointment of only such men as are manifestly suitable for the service. Should a faculty, or medical officer, recommend undesirable men, the faculty can be warned and the medical officer cautioned.

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The appointment method fixes responsibility and allows the checking of faulty action.

The *routine* of the appointment method for candidates for the *regular* corps of the army would be: (1) A medical school applies for an instructor in military hygiene and surgery; (2) an instructor is detailed who inspects the school and, if the school is satisfactory, instructs in military hygiene and surgery; (3) fourth-year students who have a satisfactory standing and so desire, make application for certification as provisional candidates for commission in the Reserve Corps, submitting evidences of citizenship, recommendation of the dean, etc.; (4) the instructor examines these applicants physically and in the subject he teaches and, from the group, approves the application of such of the candidates as satisfactorily pass the physical and his examination and *he believes to be proper for Army service*, grading the men so that when there are more than required those highest may be first appointed; (5) the provisional candidate graduates, receives a certificate of graduation, a certificate of general scholastic standing of 85 per cent or more for his four years of medical study, enters a hospital, is certified for a year's satisfactory work and is reexamined physically, if required; (6) he is then commissioned in the Reserve Corps, sent to the Army Medical School, takes the course and examinations and, if successful, is commissioned in the Medical Corps. By adoption of this method by selection, in *addition* to method by examination now in vogue, there will be *two* ways of admission to the Army Medical School. All students in the Army Medical School should be entered on an equal footing and, those who are successful, should be graded in commissioned rank exclusively upon their standing in the school.

For appointment to the Reserve Corps not looking to commission in the regular service, the routine would be the same as above, except that the applicant should not be required to have a scholarship average of 85 per cent, or the physical reexamination and the year of hospital service could be waived.

The writer has had twenty-five years' experience in the Medical Service of the Army, seven years of which was as a professor in the Army Medical School and a member of the Army Medical Examining Board, and at the same time a professor in one of the local medical schools. Since that time he has been for seven years dean of one of the local medical schools. He believes he is, therefore, able to view the situation both from a military and civil educational standpoint, and is convinced that the adoption of a method of appointment by selection could not fail to be of benefit to all concerned. He wishes to strongly urge the correlation of the services with the schools and believes that

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for *creditable*, properly *selected* students the entrance examinations now given by the Army, Navy and the Public Health Service are *unnecessary*, and that they are often a deterrent to the best graduates who desire to enter the services.

Looking to the future it is possible that a medical service school or schools for complete training in medicine will have to be established, but this in no way argues against the foregoing. Such schools could only supply, or partly supply, the Regular Corps. The Reserve and the Militia, for which great numbers are required, must depend on the *civil* medical schools. West Point now only supplies part of the commissioned force of the line of the regular army. The remainder are obtained by examination, or by appointment from certain designated colleges, almost exactly as, in this paper, is proposed for the Medical Corps.

A government munition plant could not supply all munitions for peace and war. In a scheme for nation preparedness all the industrial plants must be made available and utilized when necessary. The same holds for medical schools.

W. C. Borden,
Lieutenant Colonel, U. S. A., Retired,
Dean, Medical School, George Washington University.

NAVAL MEDICINE IN THE GREAT WAR[1]

All students of contemporary history of medical science and practice must render their grateful acknowledgment to Surgeon General H. D. Rolleston, for the lessons he has given them on "Naval Medicine in the Great War," in his memorable address, delivered before the Medical Society of London, February 12, 1917.

Perhaps never before, in all history, has the practice of medicine in the field been thus aided and supported by the great achievements of medical science, peacefully accomplished in biological laboratories, as it has in the present crisis; never before, certainly, have medical science and practice more intensively coöperated for a common or a more humanitarian end and purpose, as during the present world war and, never before have the results of such a coöperation been more satisfactory and convincing than at present! Animated by the same generous impulse, as is the author of this article, of disseminating useful knowledge and, with due apology to him for free and extensive quotations from the original paper, the writer gladly reviews the work in response to the request of the secretary-editor of The Military Surgeon.

[1] Rolleston, H. D., C.B., M.D., Cantab., F.R.C.P., Temporary Surgeon General, R. N., etc., *Lancet*, Feb. 17, 1917, p. 255.

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With reference to the subject of the *organization* of the medical personnel, some of Rolleston's statements would, at once, attract the attention of medical administrators: "At the outbreak of war the permanent medical service of the navy was at once expanded by the *mobilization of its retired members;* of officers on the emergency list; and of the medical officers of the Royal Naval Volunteer Reserve. In addition, a large number of temporary surgeons were entered, and about ten consultants were appointed, mainly to the large base hospitals. A considerable proportion of the temporary surgeons, first, passed through the large naval hospitals and received some instruction in naval routine and procedure. Rather later, an old type of naval medical officer—viz., allied to that of surgeon's mate—was revived in the appointment of unqualified medical students, who had passed their examinations in anatomy and physiology, under the title of *Surgeon Probationers*, R. N. V. R. They were usually appointed in batches of fifteen to Haslar, where they were instructed in service routine, accounts and returns and were, subsequently, drafted to destroyers which, ordinarily, do not carry medical officers." According to a letter by P. Caldwell Smith, directed to the editor of the *Lancet*, the first appointment of surgeon-probationers, dates back even to April 22, 1914, and seven such appointments had already been made before the advent of mobilization.

"The work of the clinical laboratories of the large base-hospitals was assisted by the utilization of men with laboratory knowledge but without medical qualifications, who, however, did not receive naval rank." This arrangement is very suggestive in that it is relieving the fully educated medical officers of the service from doing laboratory work and enables them to devote their time to the regular medical and surgical duties, so urgently demanded by the exigencies of the moment. "The existing sick-berth staff, being considerably depleted when the fleet was mobilized, was supplemented by the *Naval Auxiliary Sick Berth Reserve*, composed mainly of men from the St. John Ambulance Brigade."

TRANSPORT OF THE WOUNDED AND SICK

The naval transport, both in England and outside of it, has been under the control of Sir James Porter, K.C.B. We are here introduced, for the first time, to a new link in the chain of transporting naval wounded, namely, *the naval ambulance trains*. These, colloquially called *round trains*, collect patients off the hospital ships at naval bases and drop them in succession at the large naval hospitals, Plymouth, Haslar, Chatham and Portland, about twice in ten days. The larger

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of these trains are made up of twelve coaches carrying 120 cot-cases, and have two medical officers, a crew of thirty-six stewards and sick-berth attendants, but no female nurses! Such naval ambulance trains appear to be the results of an adaptation to local conditions, prevailing on the coast of England, and, where distances between naval hospitals are short, but would, perhaps, not be practicable where naval hospitals are far apart and where other than naval hospitals are within easier reach.

We may not, without further careful examination and without due regard to local conditions and requirements, apply the lessons learned abroad, notwithstanding the fact, that the experience of the present war has modified even the previous conceptions of the uses of hospital ships in this country, as well as it has in England and Germany.

"In *peace-time* a hospital ship accompanies the Fleet and serves as a mobile base hospital until it becomes full, when she leaves the Fleet, in order to discharge the patients to a land hospital and, for the time, acts as a marine medical transport, or, in other words, a marine ambulance (Elder)." This is one of the chief functions of hospital ships at the present time. The function of hospital ships in modern *naval engagements*, contrary to expectations, is no longer that of accompanying a fleet and of taking charge of the wounded, for the following reasons: "(1) The hospital ships could not keep up with the rapidly moving battleships; (2) the transfer of wounded from a battleship to a hospital ship would be possible only in exceptionally calm conditions; and (3) the transfer of wounded would oblige the battleship to heave to and, thus, expose it to hostile submarine attack. The proposition of transferring the wounded from battleships to hospital ships, by a sort of trolley, published a few years before the war, by one of our naval surgeons, seems, nowhere, to have been considered worthy of a trial in practical application.

The use of hospital ships in war-time, being of paramount interest to naval surgeons, we cannot omit what Elder says with regard to it, in the present paper by Rolleston. Elder points out that the use of hospital ships in war-time, may be divided into: "(1) The *intervals between actions*, during which the hospital ship remains at the naval base until it is full—for four or more weeks— and then discharges its patients, by steaming to a rail head, or an ambulance train. During its stay at the naval base, the load of the hospital ship may be lightened from time to time, and its stay, thus prolonged, by evacuation of some patients to a hospital carrier, which conveys them to a land hospital or ambulance train; minor cases, when cured, may be returned to the fleet;" of course, a large number of surgical operations are performed.

2. During the *post-action phase*, when hospital ships are collected at the naval bases, awaiting the arrival of battleships, the wounded are

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received by them, sorted out and the readily transportable of them, evacuated to the above and to the ambulance trains; while the severe cases, which would suffer from transport, are taken to the hospitals in the immediate neighborhood. All suitable cases, however, are at once despatched to the large base hospitals in the south of England, so as to clear the land hospitals in the vicinity of the naval bases for the reception of further instalments of wounded."

Thus, we see, that a hospital ship, during *the post-action phase*, serves many important functions: it serves as a base hospital, as a clearing hospital and as a rest station for the slightly wounded; to these should be added the function of an isolation hospital for infectious diseases. "Hospital ships, like ambulance trains, had to be brought into being when war broke out and were provided by the transformation of liners. They were staffed by the existing executive crews of the company and by naval medical officers, with a fleet surgeon in charge and with nursing sisters."

THE HEALTH OF THE NAVY

The division, made by Rolleston, in considering, separately, the health (1) of the store-depots and training establishments—the equivalents of our navy yards and training stations; (2) the service afloat, and (3) the naval division and the marines on land, is both a convenient and necessary one. Experience has abundantly shown that environment, much more than individual physiological and, even, occupational differences between men, has a dominating influence on disease incidence; any other plan of treating the subject would result in giving us averages and means, not true for any of these divisions, while a separate consideration, as is shown in Rolleston's account, reveals the most interesting and instructive differences between them in disease-incidence.

I. *The Shore Depots and Training Establishments.*—"The barracks, depots and training establishments are more exposed than the service afloat, to invasion by epidemic and other infections, on account of their contact with the civilian population, etc." "The health of the fleet has been protected by the adoption of quarantine measures as regards drafts sent to it from the shore depots." What surgeon in our Navy has not experienced the outbreak at least of measles on board a training ship after a transfer of apprentices from a training station? The great liability of shore establishments to epidemic disease, in England, is shown by the incidence of cerebro-spinal fever: out of 274 cases in the Navy, during the first two years of the war, 252, or 92 per cent, occurred on shore!

II. *Service Afloat.*—The health of the Grand Fleet, in home waters, is reported as having been extremely good, indeed, "probably better than in times of peace." While, in 1913, the average daily percentage

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of sick in the whole fleet was 2.37 and, in 1914, 2.03, since the outset of the war, the average daily sickness in the Grand Fleet has been "almost always under 1 per cent, and, indeed, has fallen since the outbreak of war!" The same was true for the Spanish-American War.

Of the *infectious diseases*, measles, mumps, rubella, scarlet fever and diphtheria are mentioned as having occurred, "but, in the majority of instances, they subsided after the appearance of the initial cases." An interesting point was the severity of measles among the Shetlanders, both on the fleet and among the reservists stationed at Lerwick, where there had been a severe epidemic early in 1915. "No case of smallpox occurred in the fleet." Small outbreaks of enteric fever occurred in three ships "traced respectively to infected oysters, dredged near Portsmouth, to a carrier, and probably to contaminated water taken on board at Montreal." In the Eastern squadron of the Mediterranean Fleet, during August, October and November, 1915, "almost every ship was attacked by epidemic gastro-enteritis which, however, died down in December." "There was a fair number of cases of typhoid, paratyphoid and dysentery between August and the end of December, 1915." "The dysentery was mainly amebic and, in many cases, was associated with jaundice."

"The health of the Adriatic Squadron at this time was excellent, and the average daily sickness for the whole Mediterranean Fleet from August 15, 1915, to October 31, 1915, was 2.24 per cent, and from November 1, 1915, to January 31, 1916, 1.52."

"During August and September, 1915, there was an extensive epidemic of dengue at Bermuda, and the average incidence of the disease in men of war was 3 per cent only." Meagher's observations are said to support the view that the disease is spread by mosquitoes!

The good health of the fleet as a whole is a tribute to preventive medicine, and, in the opinion of Rolleston, especially due to the following factors: (1) The isolation of the fleet; absence of venereal disease and alcoholic excesses, the temptations of sea-ports; (2) the quarantine precautions in drafting from the shore establishments to the fleet; (3) the lectures given by the medical officers to the ship's crew; (4) measures taken to obviate the monotony entailed by awaiting events; (5) improvement in the ventilation of ships, due to the adoption in 1914, of the recommendations of a committee of which Fleet Surgeon R. C. Munday was the secretary.

Influence of Mobilization and War on the Health of the Navy.—"Large numbers, running into tens of thousands of men of the Royal Naval Volunteer Service, the Royal Naval Reserve, and the Fleet Reserve were called up and had necessarily to be rapidly passed into the ships

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during the first few days of the war, and, as a result, a certain proportion of unfit slipped through." Numerous entries occurred of mostly the younger people, exposed to the depressing conditions incident to change of life, vaccination, fatigue of unaccustomed drills. Outbreaks of infectious diseases, consequently, occurred, such as measles, rubella, scarlet fever, mumps and cerebro-spinal fever. In the older men, physical and mental strain precipitated tabes dorsalis and general paralysis of the insane; hyperthyroidism also became unusually prominent, as did neurasthenia and psychastenia. Beaton is quoted as having found that mental troubles of a really serious nature occurred in less than 1 per cent and mild neurasthenic conditions in less than 4 per cent. In the reviewer's experience, the occurrence of these conditions, in responsible officers, may prove specially disastrous.

Casualties during Action.—Rolleston, for obvious reasons, merely states in a general way that the large number of men killed in naval action is striking, stating that "it is not considered advisable in the public interest to give the figures for the battle of Jutland, but from the total loss of battleships the numbers of men presumed to be drowned, though, of course, many in the sunk ships may have been killed, wounded or burnt, must obviously have been very large."

Antiseptic wound treatment seems not to have given any very decided results as yet. The wounds, according to Rolleston, have been classed with those of severe "machinery accidents." Burns are said to form an important proportion—at least a third—of the casualties in action. There seems to have been a general agreement that the "service picric-acid dressing" was the most efficacious' as a first application, but, subsequently, moist and mild antiseptics were found to be more suitable. The new treatment by ambrine is now officially provided in the British Navy.

Shock, even in cases of slight injury, according to Rolleston, was found to be excessive and morphine for obviating it, is said to have proved a perfect "sheet-anchor." Maclean and Stephens,[2] likewise, express themselves as greatly impressed with the efficacy of morphine in one-half-grain doses to the wounded. This treatment was, first, advocated, some time before the war, and defended against serious opposition by Dr. Zur Verth of the German Navy, who formulated his conclusions in saying: Morphium wird jedem ernstlich Verletzten bei seinem Zugang eingespritzt!"[3] Rolleston distinctly states that the sublingual method, of allowing tablets to dissolve under the tongue, was not satisfactory.

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[2] *Jour. Roy. Nav. Med. Service*, 1916, ii, 425.

[3] Gefechts dienst an Bord.—Handbuch der Gesundheitspflege an Bord v. Kriegsschiffen, p. 927, Jena, Gustav Fischer, 1914.

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Poisoning by Gases from Explosives.—While, during the detonation of shells, large quantities of CO and CO_2 are, admittedly liberated, Rolleston attributes the greater damage done, to nitric oxide. The symptoms appearing after an "uneventful interval" are said to be, possibly, due to the oxidation, during this incubation period, of the NO and NO_2 to nitric acid. As an effective prophylactic treatment, the immediate application of a service respirator, containing cotton waste, soaked in the usual soda solution, is recommended: "The respirator should be worn around the neck from the beginning of the action, so as to lose no time in putting it in position." Cases of carbon-monoxide poisoning, delayed pneumonia after immersion and appendicitis did occur; the latter did not rise above 0.2 per cent, the incidence for peace-time.

III. *The Royal Naval Division.*—"The Royal Naval Division served in Belgium, Gallipoli and is now in France under the army. The marines also fought on land in Mesopotamia." The diseases they were subject to are more those of an army in the field, than those affecting the men enlisted in the naval service; the same is true for the character of the wounds and, hence, a description of them may here be omitted.

HENRY G. BEYER.

MOTOR AMBULANCES AND PERSONNEL

Maj. Percy L. Jones, M. C., U. S. A., whom we all recognize as an expert in the principles and practices of transportation of ill and injured, has made for THE MILITARY SURGEON the following comment on this important subject. It is understood that the Medical Department is now accumulating a considerable number of ambulance bodies which will fit the usual standard chassis. The question of chauffeurs would not appear to be difficult of solution, judging by the number of cars now being run by men, women and children.—EDITOR.

The war in Europe has demonstrated beyond the shadow of a doubt the necessity for many automobile ambulances to evacuate the sick and wounded. There is little doubt that the future will prove the correctness of the statement of one of our general officers to the effect that, "horse-drawn vehicles for the transportation of sick and wounded should be relegated to the museum."

This is undoubtedly true both from the standpoint of comfort and speed. Our own experience in Mexico also bears out this fact. The ambulance company with the recent expedition into the northern part of that country was compelled to carry grain, for its own and other animals, in the ambulances. And, after reaching interior points, these

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animal-drawn vehicles were serviceable only in their camps and the immediate vicinity.

The ratio of automobile ambulances to that of animal-drawn ambulances is a question at present difficult to answer definitely. Personally, I am of the opinion that 75 per cent of all ambulances in the zone of the advance should be motor driven. If the troops with which the sanitary units are operating use motor transportation, then certainly the sanitary units can and should do likewise. Recent experiences abundantly prove that the instances in which motor transportation could not be used in the zone of the advance are rare indeed.

With the above stated ratio it is firmly believed that any situation which might arise can be satisfactorily dealt with. It is hardly conceivable that more than 25 per cent of our forces will ever operate in territory where motor transportation could not be used. If this contingency should arise, it is more than likely that little if any wheel transportation could be operated.

The character of the service rendered by automobile ambulances is so diverse that it would be unwise to designate or specify any one type for all. The type or kinds adopted should be governed entirely by the character of the service required. To say that blank truck is the best on the market and should be adopted is wrong. Granted for the sake of argument that one type is ideal. What would happen in case of war where thousands would be required on short notice? Again, assuming that they could be furnished, how long would it take to transport them to the four corners? There is no question that all the cars on the market are good, otherwise they would be short-lived under the keen competition existing. We have, as a criterion to go by, the accepted types of standard motors which have proved themselves equal to the occasion by the tests of the Quartermaster Corps. By taking advantage of the experiences of this corps the Medical Department begins with the basic factors of its problem solved, viz., price, durability, standardization and simplicity. It is incumbent upon the department, then, to add the necessary factors to complete an ambulance for field service, among the most important of which are comfort and special body design. It stands to reason that such matters as power, clearance, and other necessary specifications required by the Quartermaster Corps will suffice for the purposes of the sanitary units, for these units are compelled to traverse the same roads at the same time, and under the same conditions, as the transport of the Quartermaster Corps itself. Unfortunately ambulances should provide the most comfort where their loads are lightest—four recumbent patients—which is not now the case, but

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this difficulty can be partially solved by pneumatic tires, special springs, and shock absorbers.

The present ambulance, tentatively accepted by a board of officers, seems to cover the requirements for service with troops in the field. This is a standard type adopted after much consideration, and subject to such further changes as experience may dictate. The bodies of this car can be made up in quantities and stored. They are so designed that they will fit any chassis from a three-quarter to that of a ton and a half truck.

This standardization of the ambulance body will enable the Medical Department to take full advantage of the purchasing rates of the Quartermaster Corps. The chassis may, in emergency, be purchased from any and all makers. This latter feature insures prompt delivery of large numbers at designated points without excessive shipping charges. The question of prompt delivery is an important one, for time is, and probably always will be, with us, an important factor. By using the same make chassis as the Quartermaster Corps trucks, the supply of spare parts is facilitated, and if the present movement to standardize trucks for military purposes is successful, the Medical Department will be in a position to take full advantage of this fact. In any event arrangement should be made for the delivery of sufficient numbers of chassis to equip the present authorized forces and any reserve troops which may be authorized, this to be accomplished by a general canvass of manufacturers and, if necessary, by requisition of the motor transportation of private firms.

By all means the divisional Field Medical Units, perhaps those attached to Army Corps, should be supplied with one make of chassis. For example, divisions to be mobilized in the East should be equipped with makes manufactured in that locality. Divisions to be mobilized in the South or West should be supplied with makes which, as far as possible, may be procured in the contiguous territory. This arrangement would insure very prompt delivery; in fact, in many cases it might enable us to march details to factories or assembling plants direct, take over the motors and drive them to the divisional storehouses for immetiate emplacement of the bodies.

A goodly supply of bodies should be stored in New York, St. Louis, San Antonio, San Francisco and other probable divisional supply points, the selection of these points and the number of bodies stored thereat to be left to the discretion of the Surgeon General. In this way any number of units can be assembled and equipped at short notice.

For service along the lines of communication and at the base, there can be no question that the transportation of sick and wounded should be done by motor ambulances.

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Advantage should be taken of one of the most valuable assets of the Department—reserve personnel. With this personnel field hospitals and ambulance companies, at least the skeletons of these organizations, should be formed. At all such places as may be designated for the establishment of hospitals, such as rendezvous sites, mobilization camps, and ports of embarkation, these units should be organized. The respective commanding officers of these organizations should be given authority to canvass business firms for the assurance that one or more motor trucks will be supplied upon request. The Surgeon General's office should forward to these sites, specifications for the manufacture of the accepted ambulance bodies. If this is found too expensive or not practicable, then the bodies themselves should be shipped and stored at these points for use in emergencies. To each one of these units there should be assigned, if practicable, one junior medical officer of the Regular Corps, to assist in the organization and equipment of the unit. In the selection of motors for these reserve units the types, makes, power, etc., should conform to specifications furnished from the Surgeon General's office. If this is not done a heterogeneous mass of junk might result which would render the supply of spare parts impossible.

The question of chauffeurs is an important one. The Medical Department should institute, throughout the service, schools for chauffeurs. While it is not necessary that expert mechanics be enlisted, the chauffeurs of the Medical Department should be able to make emergency road repairs and be able to use their spark and throttle with some degree of intelligence. The qualification for these chauffeurs at present consists of nothing more than the ability to use the steering wheel. This is a sad state of affairs and an expensive one. If, through the institution of some systematic course of instruction, Medical Department chauffeurs may be required to attain the required degree of proficiency, the present undesirable conditions will be eliminated and also the Department will be in a position to demand for its men the same consideration regarding pay as is accorded the chauffeurs in other branches of the service.

As to the permanent organization of motor units there should be no hard and fast ruling at this time. This is a matter which should be controlled by experience, however, if a definite organization is to be made, then by all means it should be sufficiently flexible to serve detached units of all branches. To be more explicit it should be so manned and equiped that it can be divided into at least three self-sustaining parts.

PERCY L. JONES,
Major, Medical Corps, U. S. Army.

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CURRENT LITERATURE

Collectanea on Cerebrospinal Meningitis, in *Annali di Medicina Navale e Coloniale*, Anno xxii, Vol. ii, Fasc. iii, iv, September, October, Rome, pp. 225–314. Contributors: E. Natale, S. Quattrocchi, F. Licopoli, A. Bellocchi, L. Sestini, G. G. Conti, and G. Pellelli.

Important contributions to the literature on "epidemic cerebrospinal meningitis," deserving more than a passing notice. The etiology, diagnosis, treatment, individual histories, onset, cause of the disease, symptoms and the result of micro-biological studies are minutely described. The value as well as the short-comings of serum treatment has received special consideration.

Thus, Licopoli says: "According to Dopter, antimeningococcic serum, administered by lumbar puncture, besides affecting directly the meningeal lesions, passes into the general circulation and thus comes into intimate contact with all the cells of the organism, the same as other sera, when administered hypodermically. Absorption is rapid, hence it influences favorably also extra meningeal lesions, due to the diffusion of the meningococci." Bellocchio says (p. 252): "At present it is an accepted fact that cerebrospinal meningitis, in the epidemic form, is the typical manifestation of an infection by the meningococcus intracellularis of Weichselbaum. There are, however, along with the classical form of this disease, certain other forms of meningococcal infections (septicemias), in which the organisms become localized in places remote from the meninges and in which the meningeal symptoms proper may appear recessive or even altogether absent. More often, such a meningococcic septicemia presents but light cerebral disturbances: articular pains, febrile movements, passing angina, purpuriform or scarlatiniform erythema. The onset, in some cases, is stormy and violent, without meningeal manifestations; sometimes the septicemic symptoms precede, for quite a time, those of cerebrospinal meningitis; in still other cases, the septicemic and meningitic stages are practically indistinguishable, always leaving it doubtful whether the general infection preceded that of the meninges or whether the septicemia started from a localized center, derived from the infected meninges as a secondary occurrence.

Bellocchio divides his cases as follows:

1. Fulminating forms (two cases).
2. Very acute forms (six cases).
3. Acute forms (sixteen cases).
4. Light forms (six cases).
5. Chronic cachectic forms (one case).

His two fulminating cases died after a few hours, without prodromes, in high fever, in a state of coma, without meningeal symptoms and without the usual herpes labialis. According to Bellocchio, the dominant factor in producing a fatal result is a septicemia in its gravest form; the entire organism is invaded by the diplococcus of Weichselbaum, the meningeal inflammation playing but a secondary part in the process.

As regards the diagnosis, our author lays great stress upon the importance

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and necessity of keeping a careful watch on the first appearance of rigidity of the muscles of the neck as well as of the phenomenon of Kernig (contracture in flexion of lower extremities), since, as is well known, an early diagnosis is of the greatest importance. In his thirty cases of the disease, the phenomenon of Kernig was absent in three cases only; rigidity of the neck-muscles was noted in all the cases, without exception, and including the three cases in which the phenomenon of Kernig was absent. Bellocchi believes, moreover, that the rigidity of the neck-muscles, especially of the smaller ones, is an earlier symptom than that of Kernig, hence of the greatest importance for the establishment of an early diagnosis and treatment. Importance is also attached to the appearance of herpes labialis. Lumbar puncture, for diagnostic purposes, should be made early in the disease. The meningococcus of Weichselbaum is present in variable numbers; abundant in the early stages, it gradually becomes attenuated in the later stages, owing to a rapid autolysis which the cocci suffer and which explains its scarcity in the very acute forms, accompanied by purulent cerebrospinal fluids.

Therapeutic and Prognostic Considerations.—Bellocchi, in view of the frequency of relapses, considers it unsafe to predict the certain recovery of a case in less than fifty days. Treatment with antimeningococcic serum by lumbar puncture reduces the mortality, shortens the duration of the disease, attenuates its symptoms and reduces the number and the gravity of the complications. These effects, however, become apparent only when the serum is given early, systematically and in large doses, by lumbar puncture. The injection of the serum ought to be preceded by the evacuation of cerebrospinal fluid. Bellocchi states it as his conviction that there need be no fear of withdrawing too much of this fluid; that the withdrawal of a certain quantity has even a directly favorable influence on the case; he sums up his conclusions in the following terms:

1. In all cases, suspected to be cerebrospinal meningitis, it is the duty of the physician to make the lumbar puncture, to establish an early diagnosis.

2. In all cases of epidemic cerebrospinal meningitis, the prognosis depends on an early diagnosis and treatment.

3. Antimeningococcic serum therapy is the most rational treatment that can be employed.

4. The serum must be introduced into the spinal canal, after previous abstraction of an abundant amount of cerebrospinal fluid, in order that the injected serum may be brought in more direct contact with the local lesions than would otherwise be the case.

5. The doses of the injected serum can be large, from 30 to 50 c.c. at a time, repeated systematically and daily for four or five days in succession and in accordance with the gravity of the symptoms of the disease.

6. The first injection should be made at once and without waiting for the result of the bacteriological examination of the cerebrospinal fluid, even if the fluid should prove to be clear.

7. The injections of the serum must not be interrupted, unless the cerebrospinal fluid be found absolutely normal and free from meningococci, on microscopical examination.

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8. In cases of relapse the injections must be resumed with the same systematic and methodical manner as before.

9. Anaphylactic symptoms, ordinarily, are neither frequent nor imposing enough to form a contraindication to its use; one of the means for the prevention of anaphylactic symptoms being large doses of the serum.

10. In case of the meningococcic serum failing to produce the expected results, the possibility must be thought of that the case may be one of infection by the parameningococcus of Dopter. H. G. Beyer.

Clinical Observations in Eighty-two Cases of Gas Intoxication in the Field, admitted, on July 7, 1916, to Hotel Luna, a military reserve hospital at Venice, by Gennaro Gallo, capitano medico, libero docente di medicina infantile alla R. Universita di Napoli.

Gallo divides these eighty-two cases into three classes: (1) light cases with acute symptoms; (2) cases complicated by symptoms in other organs and tissues; (3) serious cases, with more profound pathological changes, partly in the deeper respiratory passages, partly in other organs of the body, remote from the tissues, exposed to direct injury of the gas.

I. In the first class there are included cases characterized by symptoms due to the irritating, direct action of the gas upon the mucous membranes of the upper air-passages, of a transitory character and without other morbid complications.

Symptoms.—Face congested, cough more or less violent, incessant; burning pains in throat, naso-pharynx, larynx, trachea, with dyspnoea, cyanosis of lips, external ears, nail-beds; headache, dizziness, pains in chest, abdomen and all over the body; tongue coated, abdomen tumid, meteorismus, nausea, anorexia, constipation, rarely diarrhea and vomiting; sparse dry expectoration, consisting of mucus, streaked with blood; sometimes delayed, sibilant or coarse râles in the larger bronchi; rarely hematemesis or epistaxis; more or less perspiration; pulse small, at times frequent, sometimes slow; apyrexia, weakness in lower extremities; general prostration; consciousness impaired.

Treatment.—The majority of these patients, having no desire for food, received, during the first 24 to 36 hours, only water to which had been added some coffee or marsala (wine); this was followed by a milk-diet which always gave good results; thereupon, broths were introduced, followed by soups, eggs and a little chicken, ending with three-fourths of the regular ration. All the patients received a purgative (*agua amara*), repeated as required. Local appplications, according to circumstances, consisted of frictions to the thorax and limbs; tincture of iodine was painted over painful regions. Internally, sodium benzoate and bicarbonate in watery solutions, also, Dover's powder and powdered opium were given; inhalations of ammonia and oxygen and injections of ether and of camphorated oil were given. During the first days, warm inhalations of thymol and eucalyptus oil were administered: 5, 15 and 20 grains at a time, in 100–200 c.c. of boiling water. Under this treatment, all the light cases recovered within fifteen to twenty-five days.

Here follow detailed histories of six soldiers, belonging to the second class in the division. The first of these cases presented, besides the general local

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conditions, an unusual emphysema about the base of the neck, rendering the movements of the head upon the neck and those of the neck upon the trunk as well as coughing exceedingly painful. The second and third cases were marked by a persistent and painful, double conjunctivitis; the fourth, fifth and sixth were affected by a broncho-pneumonia.

As to cases of the third or serious class, three are said to have been affected with more or less extensive pulmonary gangrene; one with diffuse bronchitis and cholecystitis another with diffuse gastroenteritis, followed by gangrene, still another with hip sciatica. From some investigations of his own and some chemical studies, the author concludes that the deleterious gas is more likely to have been chlorine. All eighty-two cases recovered!

The prophylactic measures recommended by the author, while ideal and in part ingenious, seem, to the reviewer, impracticable under the circumstances and therefore will be likely to remain, for some time, *pia desideria*.

H. G. Beyer.

Notes on the Effects Produced by a Submarine Mine Explosion. By W. E. Mathew, Fleet Surgeon, R. N. *Jour. Royal Naval Medical Service*, Vol. iii, No. 1, January, 1917, p. 108.

In August, 1916, one of H. M. auxiliary ships was torpedoed by a German submarine and sank, stern first, in about fifteen minutes.

When the ship sank, the majority of the crew had abandoned the ship, some in boats, others swimming or clinging to flotsam. One of the boats was overturned and drawn down by the vortex. The officer in charge and some of the men felt themselves driven upwards towards the surface by the force of the mine explosion. Although almost vertically over the mine end and not much more over 40 feet from it, when it exploded, none of these men felt any ill effects, while, at different distances astern of the ship and further from the exploding charge, the effect on the men in the water was most marked. All these men experienced the sensation of a violent blow upon the immersed parts of their bodies, several of them becoming temporarily unconscious. The explosion occurred at 8 a. m., and the survivors were received on board the hospital ship *Soudan* at 12 noon.

Ten of the cases gave a history of hemorrhage from the nose and ears; two passed blood stained urine, five blood per rectum and eight had hemoptysis. On admission to the hospital, there was a rise in temperature in severe cases, transient and probably due to shock. All had abdominal tenderness and complained of a sense of constriction about the chest. One officer had retention of the urine.

The above symptom passed off in three or four days, except in three of the men whose cases are given below:

J. H., an A.B., R.N.V.R., was in the water some distance astern of the ship, when the explosion took place; he felt a distinct blow over the whole of his body. After being taken out of the water he spat blood and passed blood-stained motions. His temperature was subnormal, there was tenderness over the abdomen and the recti were rigid. The temperature rose for the first three

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nights and, on the fourth day, he began to pass three to four dark, tar-colored motions daily and had pain after micturition. These symptoms passed off after eleven days of treatment.

W. W., an A.B., R.N.R., was clinging to a spar about 100 yards astern at the time of the explosion. Blood poured from his nose and he became unconscious and did not recover completely until lifted into a boat. He spat up a quantity of bright blood and passed pure blood per rectum. He was still suffering from hemoptysis on admission and was passing altered blood in his motions. His temperature rose and remained high for some time. There was abdominal rigidity with slight dulness on percussion in the flanks. Forty-eight hours afterwards diarrhea set in with griping pain and constant desire to defecate; he had difficulty in emptying his bladder and, on one occasion, required a catheter; he was discharged after eighteen days' treatment much improved.

J. J., A.B., R.N.V.R., was in the water about 130 yards from the bow of the ship when the explosion occurred; felt the shock severely and coughed up a quantity of blood. On admission, pulse slow and small, temperature subnormal. There was tenderness over the abdomen which was rigid and painful on palpation; he continued expectorating blood-stained sputum; abdomen was distended and resonant throughout; complained of pain and tenderness in the right flank and iliac fossa. On the twenty-eighth, diarrhea set in with tenesmus of the lower bowel and frequent passage of dark liquid motions; there was pain at end of micturition; temperature ran a slightly elevated course. In sixteen days, the abdominal symptoms had passed off, motions became semisolid; discharged after eighteen days' treatment much improved.

It is almost certain that hemorrhage, in all, took place from the pulmonary intestinal and vesical capillaries of the respective mucous membranes. The varying degrees of submersion of the different persons concerned at the time of the explosion would probably account for the different degrees of severity in their symptoms.

H. G. Beyer.

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BOOK REVIEWS

THE BREAST: ITS ANOMALIES, ITS DISEASES, AND THEIR TREATMENT. By John B. Deaver, M.D., LL.D., Sc.D., Professor of the Practice of Surgery, University of Pennsylvania; Surgeon-in-chief to the German hospital; Visiting Surgeon to the hospital of the University of Pennsylvania, and Joseph McFarland, M.D., Sc.D., Professor of Pathology and Bacteriology in the Medical Department of the University of Pennsylvania; Pathologist to the Philadelphia General Hospital, assisted by J. Leon Herman, B.S., M.D., Assistant Surgeon to the Methodist Hospital of Philadelphia; Instructor in Anatomy, Medical School of the University of Pennsylvania. Philadelphia: P. Blakiston's Son & Co., 1012 Walnut Street, $9.

This is a valuable book which every surgeon will desire to possess.

The high professional standing of the well-known authors renders it authoritative on the subjects treated; they say in the preface that in presenting the book to the profession they have "been moved by two prime considerations: first, the importance of collecting individual experience in order that deductions and generalizations may follow, and, second, the dissemination of known facts of vital importance in the treatment of the malignant diseases of the breast."

There are twelve chapters dealing with the following subjects: The Evolution and Involution of the Normal Breast; The Surgical Anatomy of the Breast; The Congenital Anomalies of the Breast; The Acquired Anomalies of the Breast; The Traumatic Injuries of the Breast; The Infectious Diseases of the Breast; The General Pathology of Tumors; The Non-Indigenous Tumors of the Breast; Carcinoma of the Breast; The Non-operative Treatment of Tumors of the Breast; The Diseases of the Nipple and Areola of the Breast.

The text, especially that part relating to operative proceedures, is illustrated by a large number of beautiful illustrations, mostly new.

Of cancer the authors say its nature is "unknown," and that we are precisely where our forefathers were as far as its treatment is concerned. "All that they knew, was, that the proper thing to do for cancer of the breast was to remove it. All that we know is to remove it. We do it with less pain than they, thanks to anesthetics; we do it with greater safety than they, thanks to antiseptics and asepsis; we do it with less probability of return than they, thanks to better technique, but we still do nothing to cure it."

CHARLES F. MASON.

GENERAL SURGERY, Vol. II, *Practical Medicine Series*, 1916, edited by John Murphy, A. M., M.D., LL.D., F.R.C.S., England (Hon.), F.A.C.S., Professor of Surgery in Northwestern University. Attending Surgeon and Chief of Staff of Mercy Hospital and Columbus Hospital; Consulting Surgeon to Cook County Hospital and Alexian Brothers Hospital, Chicago. Chicago: The Year Book Publishers,

This is the last volume on general surgery, of the practical medicine series, edited by the late Dr. John B. Murphy.

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In his introduction he remarks that, because of the war, there is a great diminution in the number of articles in medical literature, from European countries, excepting only those upon military surgery.

Notwithstanding this shortage in articles from abroad, enough has appeared in print at home to do full justice to the comprehensive powers of the ordinary individual, and from this material a wise selection has been made by the editor, ranging from that most important to the general practitioner, as for example, asepsis and antisepsis, and the treatment of infected wounds, to that of interest to the operating surgeon of the widest experience. Dr. Murphy, in his introduction, discusses in his forceful manner the problems of the day, and the writer is pleased at the stand taken by this keen, experienced observer, when he says, "It is most gratifying to note the great diminution in the number of fatalities and complications from anesthesia and analgesics. Many of the most ardent supporters of the nitrous oxide, chloroform, spinal block and combined anesthesia methods have become, as converts usually do, the most ardent advocates of the ether drop or vapor methods, efficiently given. A nurse properly trained can be just as competent an anesthetist as a medical graduate properly trained; either, not properly trained, is dangerous, the latter more so than the former, for he has courage without experience, a most dangerous combination in the operating room."

More important than any discussion of new technique, supposed improvement in older technique, or any other writings between the covers of this book, is Dr. Murphy's criticism upon derelictions of the profession in the treatment of the every-day-met-with acute intestinal obstructions, and appendicitis; he says, "From most reliable statistics we find 40 per cent mortality in acute intestinal obstruction, including both internal and external; that is, in this calculation 56 per cent of the cases were strangulated hernia—external intestinal obstruction. One may well ask, will this appalling mortality ever cease? Why does it still exist? Because the diagnosis is not made in time for a life-saving operation. The technique in this line of operation is superlatively good, but the clinical recognition is extremely tardy."

"There is constantly increasing mortality in appendicitis in large hospitals, and in some States it has advanced from 40 per 100,000 population in 1911, to 90 per 100,000 in 1913. Why this increase? Failure in diagnosis and procrastination in action. Just as soon as an active educational campaign ceases in the acute infections, just so soon the mortality increases. The subject needs to be all rewritten by forceful teachers every five to seven years. Let us return to our ideal—early operation is the only safe practice; we should not compromise with *crime* by *procrastinating*."

The book is full of the advanced knowledge of surgery, the introduction by the pen of the editor represents the opinions of the greatest teacher of our times upon many of the surgical problems which hold the attention of scientific progressive surgeons.

JOHN E. SUMMERS.

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INTERNATIONAL CLINICS, A Quarterly of Illustrated Clinical Lectures and Especially Prepared Original Articles on Treatment, Medicine, Surgery, Neurology, Pediatrics, Obstetrics, Gynecology, Orthopedics, Pathology, Dermatology, Ophthalmology, Otology, Rhinology, Laryngology, Hygiene, and Other Topics of Interest to Students and Practitioners. By Leading Members of the Medical Profession Throughout the World, Edited by H. R. M. Landis, M.D., Philadelphia, U. S. A., with the Collaboration of Chas. H. Mayo, M.D., Rochester, and other distinguished Surgeons and Physicians. Volume I. Twenty-seventh Series, 1917. Philadelphia and London: J. B. Lippincott Company.

The character and scope of these "clinics" are too well known to need description.

The contents of the present volume are as follows:

Treatment.—The Medical Treatment of Gastric and Duodenal Ulcer. By B. B. Vincent Lyon, A.B., M.D.

The Treatment of Epithelioma by Radium. By Russell H. Bogs, M.D.

The Medical Treatment of Poliomyelitis. By Curran Pope, M.D.

Medicine.—Syphilis as an Etiological Factor in Laennec's Atrophic Cirrhosis of the Liver. By Douglas Symmers, M.D.

Personal Researches on the Nature of Chloromata. By Dr. Max Askanazy.

On Aneurismal Obstruction of Vena Cava Superior with Special Reference to the Caval Syndrome. By P. G. Skillern, Jr., M.D.

Some Adenomatous Tumors of the Abdominal Viscera. By F. Parkes Weber, M.A., M.D., F.R.C.P.

The Electronic Reactions of Abrams. By Albert Abrams, A.M., M.D., LL.D.

Dermatology.—Acne Necrotica. By Frederick Gardiner, M.D., B.Sc., F.R.C.S.E.

Psychiatry.—The Tangled Skein. By J. Madion Taylor, M.D.

A study in Superstition. By J. P. H. Murphy.

Public Health.—Health Efficiency of Workers Due to their Living Conditions. By H. R. M. Landis, M.D.

Surgery.—The Treatment of Dislocations and Fractures of the Outer End of the Clavicle. By F. M. Cadenat, M.D. Local Anesthesia in Surgery of the Colon and Rectum. By William M. Beach, A.M., M.D., F.A.C.S.

Congenital Talipes Equinovarus with Report of a Case of Bilateral Symmetrical Talpies in Twins. By William Barnett Owen, M.D., F.A.C.S.

The Progress of Medicine During the Year, 1916.—By Frank A. Craig, M.D., and John Speese, M.D.

There are forty-three illustrations, many of them full page plates.

This volume is up to the standard of its predecessors.

The price is $2.

CHARLES F. MASON.

PUBLIC HEALTH BULLETIN, No. 83 a report on, the Transactions of a Special Conference of State and Territorial Health Officers with the U. S. Public Health Service for the Consideration of the Prevention of Poliomyelitis.

This conference was held in Washington, D. C., on August 17 and 18, 1916,

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and consisted of a health officer from nearly every State together with a number of officers of the U. S. P. H. S.

The conference opened with an address by the Secretary of the Treasury, who promised them all the support possible from the Treasury Department.

Each health officer, as called upon by the chairman, described briefly the experiences of his individual State, with the disease, the noticeable features of the outbreak, methods used to control it and prevent its spread, etc. Many noteworthy facts were emphasized during these reports and the discussions.

Statistics show that the number of cases in sparsely settled country districts was proportionately larger than in thickly settled urban communities. Cases occurred in isolated sections in the far west where there could be no question of contact to cause them. Only a minority of the cases showed paralysis. It was rare for more than one child to be attacked in the same family, even in the presence of many children of a susceptible age and even when no particular precautions were taken. The particular virus is carried in the secretions of the nose, throat, and intestinal canal. Adults may act as carriers even though they have not had the disease. Flies and other insects are under suspicion as are, also, domestic birds and animals. These are a few of the facts brought out, but enough to show that the exact method or methods of contracting or communicating the disease are not yet known. We are still groping more or less in the dark, hence the necessity for strict and uniform regulations, covering every possible avenue of ingress into a community, is self-evident. The object of the conference was to formulate such laws, the enforcement of which was to be required throughout the country.

For this purpose committees were appointed, one, to consider uniform methods of collecting statistics regarding the spread of poliomyelitis; another, on measures to be taken to prevent the interstate and intrastate spread of the disease.

In consideration of the fact that the actions of the malady are still mysterious and baffling as to method of acquisition and spread, these committees had a grave, important work to perform, which, however, they handled very ably, leaving no avenue unguarded that would tend to hold it in check should the disease again succeed in appearing in epidemic form.

The card for collecting statistics, as finally decided upon after separate discussion of its various sections, contains everything, necessary for a complete grasp of the existing conditions and will be required from each and every case that occurs.

The intrastate quarantine regulations as adopted are rigid and thorough putting the possibility of spread at a minimum and the interstate requirements, although naturally more elastic, are equally efficacious.

No State quarantines against any other State, but all travelers from infected districts are kept under observation at the point of destination for two weeks after arrival. Sixteen years of age was decided upon as the limit of susceptibility. Railroads must coöperate with the health officers and must refuse to accept travelers from infected districts who cannot present the necessary health certificate, properly signed. Where there has been a case, quarantine

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must ensue for six weeks from date of onset. These are just a few of the important regulations decided upon, after spirited discussion at times upon minor points. There are many others of equal or greater importance that space will not permit to mention. The complete regulations as decided upon are very far-reaching and the reviewer fails to see how another such epidemic as we have recently had, can get by them. Perhaps, later on, when we know more definitely how the disease is acquired and spread, it may be possible to simplify the requirements a great deal, as was the case with yellow fever. Let us hope that this will happen in the very near future.

GEORGE J. NEWGARDEN.

IS MOSQUITO OR MAN THE WINTER CARRIER OF MALARIA ORGANISMS? By M. Bruin Mitzmain. Public Health Bulletin No. 84. United States Public Health Service, Washington, D. C. December, 1916.

The author instituted a series of observations and experiments to determine, if possible, whether mosquito or man is the carrier of malaria over the winter months. He calls attention to the fact that there is a very marked unanimity of opinion by students of malaria that the mosquito phase of the overwintering of malaria is a negligible factor, but he states that there is no experimental evidence proving that this opinion is correct. In order to determine the question, extensive work was done upon fifteen plantations belonging to the Mississippi Delta Planting Company, in regions where malaria is very prevalent. Observations were made regarding the breeding and biting habits of *Anopheles*, their hibernation, and the percentage of infected insects.

As regards hibernation, it was found that mosquitoes, during the winter months, were generally absent from all places except under houses and in the deep woods, and persistent search for anopheline eggs, larvae, or pupae, which might have hibernated, proved without result. The conclusion is drawn from these observations that only the adult female *Anopheles* hibernates in this region. All of the hibernating insects were found to contain numerous eggs, and undoubtedly give rise to the spring brood.

The author found that occasional biting by roused hibernating mosquitoes was without etiological significance, so far as malaria is concerned, for of 1,211 insects dissected before May 15, not one was found infected with the malaria parasites, and all of the clinical malarial infections occurring in this region during the winter months were proven to be recurrences of previous infections.

Regarding the question of man, as the winter carrier of malaria, Mitzmain found that of 1,184 persons residing on the plantations, no less than 492 were found to have malaria parasites in their blood, 317 being infected with the estivo-autumnal parasites, 167 with the tertian parasite, and eight having mixed infections. Of the infected, nearly one-fourth (24.8 per cent) showed gametocytes in their blood and were thus true carriers of malarial infection, and some of these carriers showed gametocytes the previous fall, so that they were undoubtedly infectious throughout the winter months. However, it was shown that it was not until the period between May 15 and May 26 that the mosquitoes became infected, for it was not until this time that infected *Anopheles* were

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found in the homes of these carriers, although hibernating insects had been found previously.

The author concludes that man is the *sole* winter carrier of malarial infection. This conclusion will probably be found to be correct, although it appears to the reviewer that more work should be done upon the subject before it can be accepted, without reserve, that the malaria parasites cannot live through the winter in hibernating mosquitoes.

CHARLES F. CRAIG.

HUGHES' PRACTICE OF MEDICINE, INCLUDING A SECTION ON MENTAL DISEASES AND ONE ON DISEASES OF THE SKIN. Eleventh edition, revised and enlarged. By R. J. E. Scott, M.A., B.C.L., M.D., Fellow of the New York Academy of Medicine; Fellow of the American Medical Association, etc. Philadelphia: P. Blakston's Son & Co. Price, $3.

This is an excellent little pocket handbook of medicine which should prove especially valuable to students; that it has gone through eleven editions indicates that it has done so.

It is a small octavo of 785 pages with flexible covers and of attractive appearance.

There are no chapters; the subject matter is arranged in eleven main divisions as follows:

Infectious Diseases; Constitutional Diseases; The Intoxications and Sunstroke; Diseases of the Digestive System; Diseases of the Urinary Organs; Diseases of the Blood and Ductless Glands; Diseases of the Circulatory System; Diseases of the Respiratory System; Diseases of the Nervous System; Mental Diseases; Diseases of the Skin.

The author states that the main business of the practitioner is diagnosis and treatment of the patient and that, therefore, he has given special attention to these subjects, and this statement is borne out by a careful perusal of the book.

The subjects are handled in a systematic way and the definitions and explanations are clear and concise.

The book is up to date and contains a lot of accurate information in readily accessible form.

CHARLES F. MASON.

TRAITMENT DES FRACTURES PAR R. LERICHE. Vol. 1. Fractures Articulaires. Collection Horizon. *Précis de Médicine & Chirugie de Guerre.* Masson & Co. Editeurs.

The work deals entirely with gunshot fractures. It is exceedingly complete, and replete with valuable details in handling this difficult department of war surgery. Every joint is considered, and the author's own large and valuable experience is given as a guide well worth considering in handling such injuries.

The author is especially averse to the use of mechanico-therapy in the after treatment of joint fractures. He contends that often more harm than good is done thereby, and insists upon the careful personal treatment of his cases, using massage rather than any of the machine gymnastics now so much in

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vogue. His experience is very encouraging for the more or less perfect restoration of joint function, especially where the cases can be attended early and infection avoided. He avoids or overcomes infections largely by the immediate removal, where possible, of all bone fragments and other foreign material, free drainage and direct exposure to sunlight. As soon as the joint is seen to be free from infection, early but very gentle movement, very carefully avoiding pain is begun. Later operations, under very unfavorable conditions, have also given astonishingly good results, even where there has been considerable loss of bone tissue.

The subjects considered are as follows. Each chapter is very complete in itself: Introduction and General Considerations; Articular Wounds and Fractures of the Shoulder; Elbow; Wrist; Hip; Knee; Ankle; Anterior Tarsal Bones and Foot; Multiple Articular Wounds.

One cannot help regretting that this valuable little book is not also available in English and a translation would be well worth while.

GEO. A. SKINNER.

THE RELATION OF THE MEDICAL PROFESSION TO MEDICAL PREPAREDNESS.

In his admirable résumé, published in the *Southern Medical Journal*, February, 1917, of a subject which is now attracting more than ordinary attention in the profession, Maj. Robert E. Noble, M. C., U. S. Army, has furnished a convincing "campaign document." Reviewing the legislation affecting the medical service by the Act of 1908, he calls attention to the organization and work of the Medical Reserve Corps during the recent mobilization, when over 500 officers were in active service out of a total of 2,000.

The changes made by the Act of June 3, 1916, are clearly stated, as set forth in the circular issued by the Surgeon General's office, which was published in detail in THE MILITARY SURGEON. At the time when the paper was published (February, 1917), the total strength of the corps was 2,683. (At this date it is about 3,000.)

"This is a pitiably small number," the writer adds, "for the 100,000 physicians in the United States, when 25,000 reserve officers are needed; since over 2,000 are required for an army of 200,000 men in the field—482 more than is authorized for the entire Army under the Act of June 3, 1916!

"It is the Medical Reserve that in time of war will contribute the great bulk of medical officers, and it is only by a trained Reserve that we can escape a national humiliation, and especially the humiliation of the medical profession. Unless we have an adequate and trained Reserve the experiences of past wars will be repeated." The sad story of the Civil and Spanish American Wars is emphasized and the writer points out forcibly the fact that lack of a trained sanitary service is a serious handicap in military operations. He makes an earnest appeal to the medical profession, not only to join the Reserve and to prepare themselves in time of peace for efficient service in war, but to interest medical students in the Army as a career. Attention is called to the lessons of the present war, especially in the line of sanitation, and to the heavy burden thrown upon the medical profession of Europe in caring for both the civil population and the huge armies in the field.

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The United States is the only country in which there are enough physicians to meet this demand, but the profession is unorganized and a war in the near future with a first-class power would result in a terrible waste of life.

This lucid exposition of a subject, on which the writer speaks with the authority due to his important position in the Surgeon General's office, ought to bear fruit! Has it done so? "Though we speak with the tongue of men and angels," it sometimes seems as if we spoke to deaf ears. Can it be possible that the medical profession, like the laity, will be roused to a sense of their responsibility only after hostilities have actually begun? We hope that Major Noble's warning of possible disaster is not prophetic. It should be heeded before it is too late.

HENRY C. COE.

The Journal of the American Medical Association, for March 31, 1917, publishes an exhaustive and admirably presented article by Maj. Robert E. Noble, M. C., U. S. Army, setting forth the advantages to be derived by any ambitious young graduate in medicine, who is fortunate enough to be physically and mentally qualified to enter the corps of which he is such a well known member.

He clearly defines the life of the medical officer of the Army from the time of his acceptance as a student officer in the Medical Reserve Corps, until his retirement, describing the career from grade to grade.

He places the whole situation concisely before the civilian practitioners, and with forceful brevity. It is extremely doubtful whether more than a very small minority of the eligible graduates in medicine have an adequate conception of the opportunities which are available to the fortunate successful candidate for the U. S. Army Medical Corps.

Compare the struggles and privations of the average young practitioner, just beginning to practice, with the splendid start, ready made for him, in the Army.

As Major Noble so plainly states, he is cared for from the moment he joins until he "crosses the divide." Even as a student officer, being instructed in a course which for value cannot be estimated, so important is it, his pay is considerable more than the general practitioner can expect after some years average practice. The serious element of being obliged to hustle to make enough to live upon is removed from his shoulders at once. He can devote his whole time and energy to his work and every encouragement is given him to excel in it and to specialize if he so desires. His position is established on a high plane both in reference to his profession and otherwise. These remarks are superfluous and are merely a recapitulation, since Major Noble has thoroughly covered the whole ground.

Particularly at the present time are the opportunities unusually attractive. Due to a large increase in the Army there are many vacancies in the Medical Corps waiting to be filled by excellent men who are earnest workers. To such men a word to the wise is sufficient. Major Noble has given them that word. Opportunity is knocking at their doors. It is to be hoped that they will heed it and act without delay.

GEO. J. NEWGARDEN.

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REPRINTS AND TRANSLATIONS

MILITARY AND NAVAL MEDICAL MEN IN ROMAN AND MEDIEVAL TIMES

By Surgeon JAMES SPOTTISWOODE TAYLOR
United States Navy

THE following notes are taken bodily from a learned paper by Dr. Andrew Corsini, Lecturer on Hygiene in Florence and Lecturer on the History of Medicine in Siena, which appeared in the official publication of the medical department of the Italian Navy.[1]

ROMAN PERIOD

Under the republic there appears to have been no permanent naval establishment. Ships were built and manned as occasion demanded. Rome, during the stormy periods that characterized the sixth and fifth centuries, B. C., though often engaging in warfare at sea, got her ships and men from her allies, and this was a systematic practice during and after the Carthagenian wars. The practice of requiring allied and subject nations to meet all the country's requirements for sea service, relieved Rome of any special preoccupation in advance on this score and continued, after the establishment of the empire, until the reign of Hadrian, though in the reign of Claudius a different and more systematic organization had been begun.

The first positive evidence of employment of doctors for government ships dates only from the imperial epoch. Early in this period all permanent army encampments were provided with infirmaries and hospitals for the sick and wounded, and competent students affirm that coincident with this was the practice of giving temporary employment afloat to civilian or army physicians.

Dr. Corsini has reproduced in his article the inscriptions found in the various museums of Edinburgh, Paris, Rome, Dresden, Baden and Ravenna. The inscriptions refer to the imperial fleets with headquarters at Ravenna and Micenum respectively, and to a third fleet whose base was unknown. In each inscription the words "Medicus" and "Duplicarius" (or "duplarius") occur.

Duplicarius means a man receiving double ration or double pay, and such men were, according to the historian Livy, to be found in the Roman service as early as the fourth century B. C. The double pay awarded ashore was for faithful and long service or for some conspicuous act of

[1] Annali di Medicina Navale e Coloniale, Anno xxii, 1916. Vol. ii, Fasc. i–ii.

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bravery; but, according to the researches of Dr. Corsini, medical men in the imperial *navy* were given extra pay because it was hard to secure their services. Apparently service in the marine forces was not held in high esteem, as compared to army service. There was no distinct medical corps. The doctors had to fight as well as attend the wounded, as evidenced by the word *militavit*, "he fought" or "was a soldier," occurring in numerous inscriptions. In the army the only distinctions made were in reference to the character of duty performed, "doctor of a cohort," "doctor of a legion." All were designated "principales" or noncommissioned officers for purposes of rank and emolument. Among the "principales" were also included signal men, standard bearers, architects, engineers, riding masters and other members of special branches of service.

It is interesting to observe that many of the inscriptions studied give not only the name and pay of the doctor, but refer definitely to the *character* of the vessel in which he served, and give her *name* as though his appointment had been for a definite ship and for a definite service, in a fashion analagous to the designation *cohort* doctor, *legion* doctor employed in the army. All the ships referred to were triremes or three-bank ships.

In closing these rather fragmentary remarks on the imperial era, Dr. Corsini notes that according to Galen the fleet that went to Britain had with it an eye specialist. He notes, too, that the fleet at Micenum included a vessel named *Asclepius* and another named *Aesculapius* and that the Athenian fleet B. C. 431-401 included a trireme named *Therapeia* and wonders whether these designations were in the nature of auguries for safety and health or referred to hospital ships. Being very conservative in his views and very discriminating in his analysis of manuscripts and inscriptions, his opinion that there is nothing fantastic or improbable in the supposition that they were hospital ships is deserving of consideration.

MIDDLE AGES

The first manuscript that contains definite allusion to medical men embarked for service afloat, is by Paul of Egina and proves that by the seventh century A. D. this practice existed, under the Byzantine Empire. Paul of Egina in his preface to the work *De Re Medica*, reminds the seagoing physician of the importance of taking with him text-books on the healing art and points out that as lawyers have need of manuals and compendiums, though they live in cities where books abound, still more is it imperative for ships' physicians in remote places to be furnished with books, since they must often be far away at sea (on ships) and obliged

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to give immediate succor where ignorance and delay may mean death to their patients. There is reason for believing that in this passage Paul of Egina is addressing not only government servants but doctors embarked in merchant ships trading as far as the Indies.

Under the emperors Mauritius (582 to 602 A. D.) and Leo IV (886 to 912), both of whom wrote on medical subjects, there were in the army of the eastern empire *deputati* or *scribones*—first-aid men—whose duty it was to rush in and bear away from the thick of battle and then to treat, such as fell from their horses or were wounded. These rescuers were subsequently paid a definite fee for each person so attended. They were required to cary with them a container of water because "often the wounded faint."

From the Byzantine period we skip to the fourteenth century and to a consideration of the ships maintained by various maritime republics of Italy, such as Genoa, Amalfi, Pisa, Venice, etc.

As early as the eleventh century, however, there were barbers and barbers' assistants who practiced a rude surgery for the benefit of sick and wounded on board ship. That considerable provision for medical assistance was made during the Crusades is established by the very designation Knights Hospitalers, Hospitalers of St. John of Rhodes, etc. Pope Honorius III sent succor to the fighters in the Holy Land and, the ship carrying the cardinal legate, in addition to supplies of food, had "between decks a hospital for large numbers of sick and wounded."

A Venetian document of the fourteenth century is cited to show that at that time a war vessel might carry a physician when the individual commander desired to do so. There is reason for believing, however, that the custom dated from the thirteenth century. A poet of the thirteenth century, Francis of Barberino (born 1264), in his "Document IX Prudence," in a poem entitled "Dangers of the sea and how in part to avoid them," gives much advice to would-be seafarers and cautions against embarking without priest and barber "and doctor and all things needful for the latter." We know from archives of the Venetian republic that under date of March 28, 1300, a certain definite money grant was made to one Gualterius, a physician, who had treated many wounded on Venetian galleys and elsewhere and "received nothing by way of pay."

We know about Gualterius that he was really a surgeon, rather than a physician; that he lived at San Vito, had many nephews and pupils, to one of whom he turned over his practice on the occasion of a journey to Rome with the Venetian ambassadors. In the year 1305 he was given a definite annual salary and an "allowance for quarters." Through successive years up to 1343 he was on the pay roll of the republic and was on various occasions given additional moneys "to pay his debts," to reimburse him for expenses incident to building a hospital,

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buying "waters" and other professional necessities, and to "marrying off one of his nieces." He was so well thought of by the powers that he even secured a year's pay in advance and once a three-year advance! His hospital was built at San Biagio (De Musset's "Saint Blaise") under authority of a special decree dated February 9, 1318, and was intended for aged and indigent sailors "who could no longer earn a livelihood by their calling." It was to be under the direct and sole supervision of the Doge and "not of any ecclesiastical personage." A part of the land assigned was to be used as a garden for growing medicinal herbs.

Gualterius in his old age received special grants because he had many patients to treat and furnish with medicine gratuitously, because "he had worked until his strength gave out" and had incurred heavy expenses to keep his house in order and to sustain his art in good repute.

Gualterius, like many another disinterested and hard-working practitioner, was a poor business man and on occasions the state found it expedient to have the town crier at St. Mark's and on the Rialto caution tradesmen not to let him contract debts, being fearful that financial embarrassments and their consequences might "deprive the State of his services so necessary to it." The state was prudent enough on more than one occasion to purchase supplies and even wearing apparel for its favorite surgeon rather than intrust him with *cash*. On September 23, 1308, the Doge and Council directed the captain of the fleet at Alexandria to procure needed drugs for Gualterius, and the Venetian government agent (*consul*) at Alexandria was ordered to defray the expenses incident to said purchase. An edict of the Venetian Senate dated early in fourteenth century announces that no physician shall engage in his profession on shipboard unless, like people ashore, he has participated in the usual loans to the government. Dr. Corsini argues that, as these contributions to the government were among the principal duties of a citizen and an essential condition of citizenship and of trading rights, such a notice to physicians going on board ship proves they could not have been few in number. That they embarked to practice their professions is evident from the council order of June 3, 1322, "that one practitioner of medicine shall accompany those galleys for rendering service to the merchants and crews receiving the same salary as is customary for a surgeon."

Marin Sanudo, in his *Book of the Secrets of the Faithful of the Cross in the Holy Land* dedicated to Pope John XXII and begun in 1306, does not forget to include, in the provisions for his projected expedition to the Holy Land, "three physicians and three surgeons to go aboard the flagship." This is not to be wondered at since he recommends that the first building set up ashore by the expedition be a refuge for the sick

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and infirm of the expedition, where they may have "all things necessary for the health of body and soul." Dr. Corsini now quotes from Cecchetti's article on "The practice of medicine in Venice in 1300" references to many professional men: Giacomo di Pieve, physician who served under P. Zen, Gulf Captain (*i. e.*, captain of permanent naval force in peace times), died at Ragusa after serving on two expeditions (to Constantinople and to Sicily). Peter of Venice, physician, "quickly and genuinely prompted by love of country and devotion to his Lord." Thomas, salaried surgeon who served in Istria. Zanotto, surgeon, nephew of Gualterius, who made some "beautiful cures," served under captains (of ships of the league) "who praised him." Guido, physician, who served in the fleet of N. Pisani and in the fleet of Alexandria. Graciotto, surgeon, in the naval war with Genoa taken prisoner by the Genoese and long imprisoned by them in their capital. James of Forli, who served in the war against Padua, "a man of exceeding courage who was twice in our forts and often in danger of life through serious infirmities." Albertino, surgeon (and his son), "surpassing master of his art, killed by the Genoese while he served on board Thomas Viaro's ship." Henry of Beldemadis, given special civic honors because he had gone with the Doge's fleet against Chioggia during the war with Genoa and had also "attended the sailors and their families without charge."

There can be no doubt that from 1300 on, and perhaps from an earlier date, the Venetian republic had in its service surgeons and doctors on its galleys, regularly paid by the state. They not only served on board ship, but also "ashore beyond the seas" in Venetian possessions like Zara and Ragusa, etc. The surgeons and doctors were employed afloat not only in war but on the customary annual trading expeditions fitted out by the government. Besides private vessels there were regular fixed routes of navigation for which, at its own expense, the Republic of Venice built, armed and equipped and offered at auction galleys which were entrusted to the highest bidder, who would load them with goods and often take command himself to trade on prescribed routes after swearing fidelity "to the honor of the Republic and St. Mark." These armed merchantmen sailed in squadrons of eight and ten galleys under orders of a squadron commander. The squadron formation was necessary for self-defense as the seas were infested with pirates and offered such poor harbor facilities. "Into these harbors it was necessary to enter stern first, crossbow in hand ready for flight or fight." The fleets were named for the route they followed; *Tana*, trading with Tartars and Russians; *Syria*, to Syria and Asia Minor; *Roumania*, to Roumania and Greece, Constantinople, Egypt; *Flanders*, etc., to Tripoli, Tangiers, Spain, Portugal, France, London and the low countries. Each of the galleys in these expedi-

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tions carried, besides a captain and the necessary navigation officers, a certain number of soldiers, a chaplain, and a surgeon or physician and two young nobles about 20 years old "to study navigation and commerce." The medical men on board were regularly paid by the state. If any served during a war they had additional emoluments. If they were on board armed merchantmen, they were paid by the captain or the agents, or even by the state itself. Sometimes their salary was derived from detained portions of the crew's pay or a tax levied on such pay. It is to be noted that the pay was very liberal. It is recorded of Surgeon Bonaventura of Verona that he went on "a voyage to Trebizond," hoping to profit thereby and because "he did not relish shore duty" in Candia.

The medical officers were able to engage in a little trading on the side for their own profit, but had to get special authority for this or be fined, as happened to our famous Gualterius twice, who omitted this formality when trading in spices once on a voyage to Rhodes, once in the squadron of Teofilus. Dr. Anthony of Cremona as late as 1366 was fined for not having secured the necessary permission to engage in trade. The republic frequently allowed their salaried navy doctors to enter the service of some special institution or foreign prince. There is a record of at least six of them who served as medical advisers to various kings of Cyprus. While so serving their pay from Venice stopped, but their places were held open for them against their return.

From all that has gone before, Dr. Corsini concludes that throughout the fourteenth century the Republic of Venice had a regular naval medical service, and he cites the record of constant demands on the part of captains for assignment of doctors by the state and of constant licensing by the state of physicians to fill these billets. All through the first century the custom outlined above prevailed in Venice, and the flagship of armed merchant squadrons carried both chaplain and surgeon. The doctor sat at table with the captain, owner, chaplain, noble bowmen and merchants.

In regard to ships of war the author of our article cites a little known manuscript in the library at Chantilly (magnificent ancestral home of the Condé family near Paris) which states that the "*Captain General* (corresponding to admiral of our day) had with him in his fleet a Secretary of Chancery, a chaplain and a doctor and a surgeon who in setting out are paid by the college of physicians."

Dr. Corsini concludes his delightful article with the postulate that other Italian republics—Genoa, Florence during its brief possession of a navy, the Papal states, Pisa, etc.—employed doctors on their war vessels and had a system for their appointment and control which followed in a general way that of Venice.

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CLINICAL NOTES

REPORT OF TWO FATAL CASES OF PARATYPHOID FEVER, TYPE "A"

During the mobilization of the National Guard on the Mexican Border a great many cases of paratyphoid fever occurred. These cases were mostly infections with the B paratyphosus "A" and ran a mild course as compared with B typhosus infections.

The two cases here described are thought to be unusual enough to justify reporting them.

Case No. 973. Pvt. W., aged 39, admitted to Camp Hospital, McAllen, Texas, October 13, 1916. Diagnosis on transfer card "Fever, type undetermined."

Family History.—Father and mother both died from some form of heart disease; one brother died during infancy from an unknown cause. Family history otherwise negative.

Personal History.—In civil life is a train despatcher. Uses alcohol in the form of beer and whisky.

About eight years ago had an operation on his thyroid gland on account of its being enlarged and states that he made a good recovery.

Has always been healthy otherwise and denies all form of veneral infection.

Patient states that in August, 1916, he received three doses of the typhoid prophylactic but no record of this is shown on his descriptive list. Had never had the paratyphoid prophylactic.

Present Trouble.—Was taken ill about ten days prior to admission (October 3, 1916). Started with what the patient terms indigestion. He was unable to take food because he would vomit immediately after eating and had lost all desire for food. He had cramp-like abdominal pains and belched large quantities of gas. States that several times during the week prior to admission his abdomen had been markedly distended.

Has had no diarrhea or nosebleed.

Condition on Admission.—Patient feels weak and complains of a severe headache, feels tired out and bones of legs and arms ache.

Belches up considerable gas at times, and has frequent attacks of pain in abdomen which seem to be relieved by the gaseous eructations.

Bowels are regular but movements are very small in quantity. Appetite is poor.

Has lost about twenty pounds in weight during the past month.

Physical Examination.—Patient is a fairly well-developed male.

Tongue is broad and flabby and is covered with a thick yellowish coating. Breath is foul. Pulse is of good quality. Heart action is regular and no murmurs are audible.

Breath sounds are normal and no râles are heard.

Abdomen shows generalized tenderness and there is a moderate amount of distention. The liver and spleen are not palpable. The nervous system, bones, joints and muscles are negative. Blood cultures were made on October 13, October 19, and October 27; all of these were negative. Three feces examina-

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tions were made, the first two failing to reveal any of the organisms of the typhoid group, but on November 4, 1916, an organism was isolated from a stool which gave the reaction of B paratyphosus "A" on Russell's double sugar media; this organism agglutinated with specific paratyphoid "A" immune serum in a dilution of 1 to 5120.

Progress of Case.—October 26. Patient passed some blood in stool; his general condition is good, however. October 27, had a hemorrhage of considerable extent at 12.30 a. m. Passed a great deal of fluid blood involuntarily into the bed. Temperature fell to 99 and pulse immediately after the hemorrhage was 120 per minute, soft, compressible and running in character. October 28, had another hemorrhage at 3 a. m. Patient is somewhat pallid and pulse is weak. November 1, pulse is of fair quality but rapid. Patient somewhat improved. November 3, respirations increased in frequency and pulse is rapid and of poor quality. November 5, about 11.30 a. m. complained of severe abdominal pain in upper part of abdomen. Examination shows moderate abdominal distention and considerable tenderness on the right side, more marked in the upper part of abdomen. White blood cells at this time were 12,200 per cubic millimeter. A perforation of the intestine was suspected but on account of the patient's weakened condition operative measures were contraindicated. The patient rapidly became weaker and breathing became thoracic in type, pulse rapid and thready.

Patient died at 9.45 p. m.

Autopsy Report.—A limited examination of the abdominal organs was made and the following conditions noted:

Musculature of abdominal wall is red and fairly firm, subcutaneous fat is rather scant.

Upon opening the abdomen about 500 c.c. of somewhat turbid straw colored fluid was found in the peritoneal cavity. A culture was made from this fluid and the B. paratyphosus "A" was isolated. The peritoneum covering the organs in the upper abdomen was smooth and glistening. The covering of the caecum and the lower part of the small intestine was red and injected, and the intestines in the right lower quadrant of the abdominal cavity were bound together by means of numerous newly formed adhesions. The ileum showed a number of small ulcers in the lower part and two very large ones measuring about 2½ cm. in diameter. One of these ulcers had perforated and when this portion of the bowel was removed presented an opening about 1 cm. in diameter.

The portions of the intestine containing these ulcers were removed and sent to the Army Medical School for examination. Histo-pathologic examination showed that the perforation had the appearance of being due to the ulcerative process.

Case No. 1224. Private S., aged 21, admitted to Ward B, Camp Hospital, McAllen, Tex., October 27, 1916, and was under the care of Lieut. H. A. Riley, M. C. N. Y., N. G. U. S.

Family History.—Negative.

Personal History.—Has had the ordinary diseases of childhood, but has always been healthy otherwise.

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Had three doses of the typhoid prophylactic in June and July, 1916, and had one dose of paratyphoid "A" prophylactic during the week prior to admission.

Present Trouble.—Started October 24, 1916, with muscular stiffness, pain in the back, dizziness, headache and fever. Has been having chilly sensations daily. Has had no cough or nosebleed. Bowels are regular.

Condition on Admission.—Patient is a well nourished and developed male. Special senses normal. Tongue slightly coated, no eruption on body. Glandular system normal. Pulse is regular and of good quality and heart is normal. Lungs are clear and respirations normal. Genito-urinary system normal. Abdomen negative, spleen is not palpable. Blood culture positive for B. paratyphosus "A," the organism isolated agglutinating with specific paratyphoid "A" immune serum in a dilution of 1 to 5120.

Progress of Case.—October 29, a few suspicious spots are to be seen on the skin of abdomen.

October 30, the tip of spleen may be felt on extreme inspiration. Patient feels much better.

November 3, complains of slight pain beneath left costal margin in the region of spleen.

November 5, patient stated in the morning that he felt quite well but later in the day he began to have cramp-like pains in lower abdomen, vomiting of greenish fluid and frequent watery evacuations. When examined his abdomen was tender especially on the right side and very tense; there was tympany all over with loss of liver dullness. It was thought at this time that there might be a beginning perforation with a local peritonitis. He was given turpentine stupes, a rectal tube was passed and morphine gr. ¼ was given, but there was little diminution of symptoms.

November 6, patient was slightly better in the morning; abdominal wall was still tense and diarrhea still continued. White blood cells 19,000 with 92 per cent polymorphonuclears. Temperature showed a continuous rise until at 3 p. m. it was 104.5° F., pulse 120 and respirations 36. Abdomen more rigid and leukocytes 30,000 with 94 per cent polymorphonuclears. Vomiting and diarrhea still continued. Patient appeared much worse, face flushed and perspired profusely, but is not anxious and is not in any great discomfort. There seemed at this time to be some shifting dullness in the abdomen. A diagnosis of perforation made and operation determined upon.

Operation.—By Capt. Geo. J. Laurence, M. C. N. Y., N. G. U. S.

A 5-inch median incision was made and abdominal cavity found to contain a large quantity of serous fluid. Omentum was thick and adherent to peritoneum and intestines. Thick heavy pus flowed from the direction of the right iliac fossa. The small intestines in this region were matted together with a thick exudate and were discolored. On slight displacement a large abscess cavity deep in the pelvis was found. This cavity was irrigated and drained, a small opening being made in the right lumbar region and drainage inserted. Abdomen closed and sent to ward where continuous saline proctoclysis was administered.

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The patient reacted well from the shock of the operation and on the day following temperature was 99.3, pulse 90 and respirations 26 per minute.

The temperature ran an irregular course and patient became weaker and vomited at frequent intervals, being unable, the greater part of the time, to retain nourishment. Died on November 14, 1916.

GEORGE F. LULL,
Captain, Medical Corps, U. S. Army.

DON'T

The following thirty "don'ts," for the preservation of good health in camp, were published to the Eleventh Division Surgeon, El Paso, Tex., upon the recommendation of Maj. H. L. Gilchrist, M. C., U. S. Army, Division Surgeon.

DON'T disobey the laws of common sense; fail to realize that you, personally, are responsible for the condition of your health, and if you take the same care of yourself in camp as when at home, there is no reason why your health should not be equally as good if not better; fail to keep your person clean at all times; fail to take a bath at least once each week and put on a clean change of underclothing; fail to wash your hands and face before eating; fail to wash your hands after visiting the latrine; fail to have a good tooth-brush and use it once daily at least; fail to change your socks frequently; fail to keep your finger nails clean at all times; fail to have your bowels move at least once each day; keep your tent too hot; think cold pure air is detrimental to good health; think hot impure air is conducive to good health; sit around a hot fire in a closed tent on a bright sunny day; fail to keep your tent properly ventilated at all times; fail to air your bedding daily; fail to extinguish the fire in your tent before retiring, remembering that it burns up the oxygen or air intended for you; enter a heated tent and fail to remove your overcoat or sweater, immediately upon entering; leave a heated tent and go out into the cold, bare-headed and without proper clothing; sit around in a hot, ill-ventilated tent if you have a cold, but seek the sunshine, remembering fresh air and sunshine are required; take active exercise and then stand around in the cold without proper clothing to protect the body; fail to realize that colds are contagious, and avoid the breath of one suffering from such condition; fail to devote several minutes daily to taking lung exercises; fail to seek the advice of your surgeon when feeling ill and fail to follow his advice when given; eat too rapidly; take active exercise either before or after a hearty meal; over-indulge in alcoholic liquors, it is dangerous; forget that the large majority of prostitutes are diseased; fail to use a prophylactic immediately after having intercourse with a prostitute; censure your commanding officer or the Government for the condition of your health if you disobey these rules.

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CORRESPONDENCE

KANE, PA.

The Editor, THE MILITARY SURGEON.

DEAR SIR: Thinking that the impressions derived from a brief visit to military hospitals abroad might be of value and interest to our members, I have jotted them down, realizing that my visit was all too brief to study the underlying professional psychological, economic, physical and military conditions, a further knowledge of which might cause me to modify my views.

This unprecedentedly horrible European war exhibits new features undreamt of before, as striking for their ingenuity as for their cruel inhumanity. Solomon said, "There is no new thing under the sun"; yet, noteworthy among fiendish novelties is the use of irritating gases, chlorine, and bromine, which produce a deadly and hopelessly unmanageable pneumonia. This, after hours or days of torture, forces the sufferer to succumb either to heart failure through capillary obstruction or to a death by slow drowning, the lungs gradually filling with fluid. Almost new, by the improvements made in its manufacture and its extended application, is the use of liquid fire (a modern application of the ancient Greek fire) as a death-dealing agent. It causes singularly deep sloughing wounds that lay bare sinews and bones and subject the sufferer, if he recovers to a long and painful convalescence. The employment, also, of gasoline motors, automobiles, etc., for increasing the rapidity of progress, adds to the feverish haste exhibited to destroy ruthlessly and speedily. On the other hand, the benefits derived from the, now apparently perfect in technique, X-ray examination of the injured, the employment of vaccines (especially for typhoid and tetanus), and such protection as has been afforded by the scientific elimination of alcohol as a stimulant and its practical abandonment from the armamentarium of the hospital surgeon, are among the few palliative offsets to the superior havoc of this war which should receive recognition.

But little, however, of what the American surgeon, with his initiative genius and constructive versatility, would consider progress in either surgical technique or procedures has been made so far by surgeons in the European war, at least in comparison with the splendid opportunities afforded. It is, in fact, rather conspicuous by its absence. This is quite natural, however. When we consider the obstacles to be encountered, the urgency of the daily exigencies in this enormous, ever-increasing influx of material, and the extremely limited personnel, we will see that the army surgeon is sorely overtaxed mentally and physically. His days at the front run one into another with scarcely sleep enough between to preserve his health and sanity. Drugs, medicines, appliances and surgical supplies often limited or wanting, he has more than enough to do to accomplish the task of saving life and limb in the crudest manner, let alone developing his faculties as an inventive and creative genius. His courage is unbounded, for he faces danger unflinchingly. (It has been shown that at the front as many surgeons have been killed or wounded as officers, and their heroism and devotion to the cause of humanity deserve a tribute of undying

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praise.) It will not be until the war is over, when methods, systems and results have been systematically compiled and tabulated, that any definite conclusions or proof of general advancement in surgical procedures and technique and medical knowledge can be arrived at. Certainly after the war has ended—and end it must some time—there will be a most rich and abundant harvest for investigation and suggestion in clinical research. Yet, if we are to judge analogically, by the results gained from experience in our Civil War, much disappointment will be encountered, and obviously for the same reason; the duty of the army surgeon is to work rapidly and efficiently. His work ended, his interest naturally ceases, and that is all. An exception to this criticism might be made in regard to dental surgery, much new, ingenious and skillful work having been therein exhibited.

England impresses the visitor as one vast series of training camps and convalescent hospitals. Khaki uniforms are everywhere, in hotels, places of amusement, in railway coaches and on the crowded streets. It is sad to witness how many of these duskily attired pedestrians are cripples with crutches or sticks, a hobbling gait and a face drawn by pain and anxiety. They shuffle along with an empty sleeve, or a missing hand, or, still worse, with a face marked by some horrible disfigurement due to explosives. Sightless eyes, and torn-away noses, mouths and cheeks are covered by the ever-present flesh-tinted celluloid patch worn to hide as far as possible their disgusting appearance. Those who the ingenious and kindly surgeon has endeavored by plastic surgery to render presentable seem, after all, to look worse than those who have been let alone, because of the suggestion presented. It is impossible to undo the mischief which this fiendish war is constantly creating, and the feeble attempts seem to emphasize, rather than detract from, its hideousness.

Mingling with this procession of halt, lame and blind, and with most tragically gruesome contrast, are the marching procession of soldiers who, having just completed preparation in training camps, are seen in long gray-brown lines tramping out to the front. Bands are playing and the eager crowds that line the streets on each side seem, by their clamorous hat and handkerchief waving, hand clapping and shouting, to be cheering them on to some glorious holiday joust rather than to the certain fate or wounds or death.

With equal incongruity, in the care of the sick and wounded there is a striking exhibition of the irreconcilability of sentimental humanitarianism, the romantic (so to speak) Evangeline disposition toward suffering humanity, and the cold, rigid, methodically calculating oversight by the military officials. The former under the auspices of humane and charitable organizations, as the Red Cross, fostered by the philanthropic with the spirit of mercy, call into action hosts of amateur women nurses, religious devotees, and those with patriotic aspirations whom ill health or age debar from going to the front: the latter, the dominant element of course, is the regular army machinery, a most perfect mechanism, but as coldly unsympathetic as the steel of its bayonets and the iron hand of its director. Thus, the wounded are nursed with a solicitude such as our regular trained nurses would ridicule as absurd; dainties, flowers and expensive gifts are heaped upon the sufferers by an adoring public,

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while the clergy deliver eulogies upon them or their remains. The rigid army regulations at the same time are uncompromisingly enforced in order that its clockworks shall neither be stopped nor retarded by the fear of death or the hope of salvation. To the young physician with much of the laboratory, the microscope and the theory of medicine still clinging to him, there is much to captivate, and many new and striking things to be gathered from this military hospital work, especially if he has the surgical aspiration fever so common with beginners; but to others, the older men, it is disappointingly commonplace. It resembles somewhat a mingling of railway surgical work with the higher class specialized surgery. There are, of course, differences between war and civil surgery; yet when, as I saw it, the injured have been cleaned up, and the emergency work at the front has been completed, that part which is not unlike railway injury material has no more of its harrowing crudity. On the medical side, however, there is much that is new and unique. Thus there is a peculiar form of cardiac disease, due probably to prolonged nervous and mental strain, alarm and excitement, coupled with loss of sleep and privation, which demands a large amount of consideration—entire wards being devoted to these cases. A heart much like that which was encountered in our Civil War, and well described by the late Dr. J. M. DaCosta, is everywhere to be met with now in this much more strenuous combat. The various neuroses, psychoneuroses, mental and nervous perversions and deviations from the normal type, are a rich field of study. They promise much for future observation as to end results. Where portions of the nerve are wanting through complete destruction there is furnished an ample field for study of the rate of nerve regeneration. The results obtained by nerve anastomosis and transplantation should be of much clinical importance.

I regret that with the brief space allotted to me in this paper I cannot dilate upon many of the interesting phenomena afforded. There is one striking contrast of a gratifying nature between the work accomplished in the present war and those of earlier days, like our Civil War half a century ago. This is especially noted in the conservative treatment of the wounded. Arms and legs in the present war are saved almost invariably if there be tissue and circulation enough to retain life, instead of, as used to be the case, their being lopped off haphazard. It was my good fortune when, as the student of an old army surgeon some thirty-seven years ago, I accompanied the Mexican so-called army of the Leardo Revolt in Mexico, to observe and assist this surgeon in his work. He had been all through our Civil War and followed the teaching there received, which was to lop off arms and legs in what would now be considered a most unjustifiable manner. He told me on more than one occasion that outside of each field hospital operating department there used to be a stack of legs and arms, chucked out as they were hewn off after each engagement; and from the way he proceeded, skillfully though brutally, I believe this to have been the case. In the present war the criticism now being made is that they are erring too much on the conservative side. In their effort not to sacrifice a limb they will allow a most dangerous amount of suppuration to go on for a long time, until, though the limb is saved, the constitution is irrevocably undermined,

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and the member when preserved is often so schlerosed as to be well-nigh useless, as also the seat of grave and painful nervous disturbances, which render it worse than useless.

One would have hoped that during this war there would have been discovered some new and superior form of anesthesia, yet here, too, we are disappointed. Ether and chloroform still hold the supremacy, and this without even the enjoyment of any especially ingenious new form of inhaler or method of inhalation. The same is true as to the employment of anodynes, except that asperin now is largely employed as a substitute for morphine. Save in the severer cases no change has been made as to analgesics. Having run the gamut of germicides, and after going crazy at first about iodine, all our stronger antiseptics seem to be, if not abandoned, at least very much less employed than at the commencement. While iodine is still used to some extent, generally in weak solution, yet it has fallen largely into disrepute abroad as it has here. I was much pleased when attending our military training camp last summer at Plattsburg to learn from our instructor, Major Huntington, that the U. S. Army had now officially omitted iodine from its emergency kit, having learned that its haphazard employment did much more harm than good. Much the same opinion was expressed to me by surgeons abroad, and I was glad to note it, as I never myself became infatuated with this acrid, painful and destructive chemical. The milder antiseptics, both for the washing out of wounds and application to the surface, seem to be better thought of. Sodium hypochlorite, in what is known as Dakin's fluid, and other non-irritant alkaline solutions are most favorably looked upon. Free and thorough drainage is recognized as doing far more than antiseptics for the class of cases where sepsis promises to give future trouble. Of course we must admit that, as referred to above, the vaccines, antitoxins, and so forth, have done wonders in the present war, as is notably shown in the treatment of tetanus and typhoid fever; yet, on the other hand, gas-gangrene, a disease not wholly unlike the old moist gangrene of our Civil War hospitals, seems to be little affected thereby.

I would mention in passing that radium, in the form of radium emanation water, has been found to exhibit no small practical utility as a moist dressing to suppurating wounds with sluggish granulations. It appears to have a selective action, and the field for usefulness in this direction merits future observation and experimentation. It is useful, also, in the treatment of neuromas; and is, as we all know, most valuable as a curative agent for keloids, and as keloids must develop in a certain percentage of scars after war wounds it will undoubtedly be of service later when the keloid growths will inevitably begin to manifest themselves.

The writer has obtained astonishingly gratifying results in the treatment of keloid growths, either those growing out of the scar of operative incisions, the cicatrices of large granulating wounds, or preëminently those which are seen upon the site of former extensive burns. In these instances, by the proper application, with suitable dosage and with correctly timed repetitions of treatment, restoration of function and the production of an excellent cosmetic effect can be expected.

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Splints and dressings for fractures, both simple and compound, have made but small advance over former war times, which is surprising when we consider how great a tax upon the ingenuity of surgeons has been made to find means to construct suitable apparatus for so vast and varied a class of fracture cases. Plaster of Paris and metal splint devices still seem to take first place. The overhead pulley extension, though not entirely new, has been modified successfully to meet more diverse needs than formerly, yet herein, too, there is nothing very remarkable.

Prosthetically speaking, the multitude who are minus one or more extremities must afford a field for ingenious work in the adjustment of false extremities richer than has ever been dreamed of before, and we may look for methods of attachment to severed muscles and sinews, and even perhaps to bones, which should revolutionize the work of the artificial limb manufacturer.

Some progress has been made in the management of chest injuries, work upon the heart and lungs; and the employment of larger magnets for the withdrawal of steel and iron projectiles has an interesting attraction (!) and seems to merit observation.

The septic infection so frequently encountered before reaching the hospital has been hard to overcome. The effort has been made to eliminate this difficulty by doing as little as possible upon the field, and hurrying the wounded back to suitable hospital environment with the greatest expedition. Thus, it is not infrequently that a lot of wounded soldiers reaches one of the large military hospitals, with all its modern facilities, in the heart of England, forty-eight, or even thirty-six hours after the receipt of their injuries at the front in France, this rapid transit being made by auto ambulance, railway and steamboat, with incredible rapidity, the organization and management of the system being perfect.

In closing let me call attention to a serious error and an injustice done the army management relative to alcoholics. You know how frequently we have heard that it was the custom in Europe to furnish the troops with sufficient alcoholic ration to partially intoxicate them before a bayonet charge, this being found necessary in order to raise the brute in their natures to the point of perpetrating so peculiarly inhuman a form of murder. I made this a point of careful inquiry among the wounded and convalescent soldiers from various parts of the front. They all concurred in denying it. A number of them stated that it would be absurd to suppose such a procedure practicable because it had been so generally recognized that if the men were furnished liquor before a charge they lost their heads to such an extent that they became unmanageable and dashed ahead blindly without either reason or judgment, seeming deaf to a recall and rushing on into the ranks of the enemy in a most foolhardy and reckless manner.

Very truly yours,

EVAN O'NEILL KANE.

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COMITE FRANCO-AMERICAN,
17 RUE BOISSONADE,
PARIS, January, 1917.

To the Editor, THE MILITARY SURGEON.

You ask me to send you from time to time my experiences: I have so many that I hardly know which ones will interest you; all of my cases interest me, and I give them my best attention and ingenuity, trying to correct each and every deformity which comes to me; when I cannot correct it, I try to relieve the strain and suffering. So far, I have found no two cases exactly alike, although many are similar as to medical history. So much enters into the convalescent state, the temperament of the man, his power to help himself, and the interest and capacity of those who surround him.

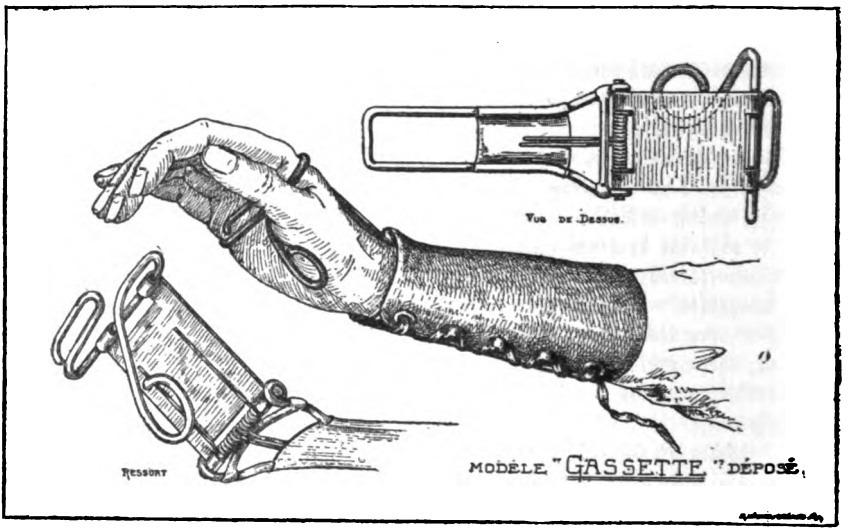

FIG. 1.

For a long time the "hand drop" appliances have interested me. I have many cases which require these appliances, so many men with the radial, medial or cubital, severed or paralyzed; the majority of these cases have partial ankylosis of the wrist; few of the hands can be raised even to the horizontal position.

The first splint for this purpose that I saw used was applied by Dr. Robert B. Osgood, and he called it the "Cock-Up." It relieved strain and prevented hand drop in many of the nerve lesion cases. Dr. Osgood has written of this splint in *The Boston Medical Journal* of January 27, 1916.

I am indebted to Dr. Osgood for ideas which have helped me with many of the problems brought to me.

The "Cock-Up" was very good to prevent ankylosis and relieve strain, but I did not feel that a fixed splint, even if it could be bent at various angles, was the "last word," and I tried several systems with more or less success; then I bought several appliances that had been worked out and placed upon the market,

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but none of them satisfied me. Finally, one night after I had struggled with a large and heavy hand with very poor results, I went to my workman, an intelligent locksmith, and said, "Rosembau, I wish that you would make me some kind of contrivance with springs to hold up a man's wrist." The next morning when I went into the shop he gave me an idea which changed my train of thought and before night I had worked out the appliance which has proven to be successful in so many cases. It is a simple anterior appliance (Fig. 1) made of aluminum plates, one for the forearm and the other for the hand. The latter I vary in form but usually make it wider and longer than the hand; the two plates are united with a hinge, over which I bend flat ribbon steel springs varying from half a millimeter to a millimeter in thickness, and eighteen millimeters wide, slipping the ends into pockets made of aluminum. The appliance is light, and

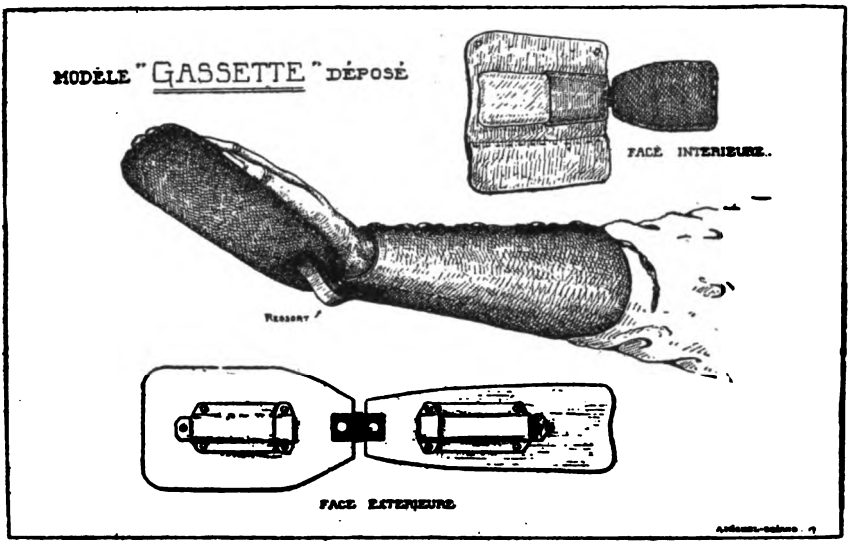

FIG. 2.

having the removable springs, can be modified easily as the case improves; also the hand plate may be bent to suit the conformation of the hand. This hand-plate is padded and covered with a fine grade of red rubber sheeting which can be easily washed; the forearm plate is encased in a leather cuff which is laced. Where the fingers are bent and have a tendency to contract, I use a leather hand band. At present I have a case which was sent to me by Prof. Walther with a typical claw hand, partial ankylosis of the wrist, marked ankylosis of the index finger and little finger. He was wounded by a ball, September, 1914, which cut the cubital nerve, the cubital was sutures; July, 1916. Prof. Walther's operation has been most successful.

When the man came to me his fingers were flexed against the palm. I started by using weak springs and placing cotton under the fingers, to force them as much as possible without strain, holding them in position with a hand band. Little by little the wrist gave way, the fingers relaxed, and the nerve showed signs

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of life. Now after four months he has fairly good power in his hand, the wrist is limber, and I have no doubt that the hand will eventually become normal.

I have another case where I have to separate each finger with bands which I lace into the hand plate. It is a case of radial paralysis which has had the nerve sutured and is making marked progress. In over 25 cases I have succeeded in completely breaking up the ankylosed condition of the wrist, and now have my new posterior splint on them. (Fig. 2.) This posterior splint is the result of two years' study and experience. I believe it is the best splint for hand drop where the wrist is limber and the fingers have no tendency to contract. Like all good appliances it is simple, so simple that I wonder that I did not think of it before. After many observations of cases I found that each man had his particular points of support, which varied according to the formation and condition of the hand, so that one could not make a satisfactory stock splint. This appliance is quickly made: it consists of a heavy wire three millimeters in diameter which is turned first to support the base of the thumb, then passes between the thumb and index finger over the back of the hand, terminates in an oval in the palm of the hand, making sure that it does not touch the hand except at the two points of intended support. This wire is soldered to a brass plate upon the posterior part of the hand which corresponds in length with the back of the hand from the phalanges of the wrist. It is hinged at the wrist to a wire forearm splint; the hinge is sufficiently raised from the wrist so there is no pressure upon the bones of the wrist; about the hinge are coiled two springs, right and left, by which the exact force required to raise the hand is obtained, the wires of the arm part are held rigid by a small aluminum plate; after the metal part is nickel-plated it is incorporated in a leather cuff. This splint gives the man the freedom of his hand, and in only a few cases have I had to pad the hand rings. I have added in several cases, where the median was cut, other wires to aid the men in their particular trades. I also modified it for cases of amputated fingers. where the remaining fingers overlapped. I could give you at least twenty-five histories of cases where I have used this appliance with special modifications according to the needs. Where the wrist is not very strong I give the patients both the posterior and anterior splints, using the anterior one at night.

I have another claw hand for which I gave the man the two splints; he wears the anterior one most of the time. His hand is so nearly straight that I felt that he would gain more rapidly if he could exercise his fingers; after questioning him as to how he could use his hand in some work, he said, "Mlle., I used to play the violin; I might try that," and he practices every day.

I have heard so many doctors and nurses say that the men will not try to help themselves. This has not been my experience; I find them most ready to do anything to regain the use of their maimed members. They try everything that I suggest that may help them. I always take them into my confidence, telling them that I am a novice at my work, that I have infinite patience if they have, but that they must help me, so together we work it out, and they are as happy as I am when they commence to make progress. They all like to come to the clinic; they are sure of a warm welcome, and feel that we are their friends. The foreman of my shop is a most intelligent soldier, and he

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has had respect for my mechanical ability ever since he discovered shortly after he came to me that I could make anything that I asked him to do, except that I have not always the strength in my hands to turn the iron. Often we go without our lunch or are late to our dinner because an appliance is half done and the patient is so anxious for it we have not the heart to disappoint him. I always make what I call a trial apparatus, which I modify until I have done my best, and then an appliance is made just as solid and of as good material as I can find.

When my patients go home they write to tell me how they are progressing, then, if I have found an improvement in their apparatus I write to them and they come back and I make the changes.

Faithfully,

GRACE GASSETTE.

INSTRUCTION OF MEDICAL RESERVE OFFICERS

Referring to Maj. Henry C. Coe's essay which received honorable mention in the Wellcome Prizes Contest, published in THE MILITARY SURGEON, March, 1917, Major Shockley, M.C., U. S. A., director of the correspondence course for medical officers, calls attention to the error in Major Coe's statement "that instruction in the particular of equipment, travel orders, allowances, customs, etc., was not provided for officers of the Medical Reserve Corps," and forwards copies of bulletins Nos. 1 and 2 and 5, issued from the school in 1915, covering very minutely the subjects referred to. The acting editor recalls that Major Coe wrote asking that if practicable his paper be corrected to meet Major Shockley's criticism, but the journal had gone to press.

The bulletins above referred to are very complete and should be in the hands of every Medical Reserve Officer, to whom they would prove an ever-ready friend and guide. To insure this it might be well to inquire from time to time if the officer has them, and clinch it by correspondence questions. One or two in each series the answers to which are found in the bulletins—doubtless, this is being done.

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THE MILITARY SURGEON

PUBLISHED BY THE
ASSOCIATION OF MILITARY SURGEONS
OF THE UNITED STATES
ARMY MEDICAL MUSEUM, WASHINGTON, D. C.

JUNE, 1917

VOL. XL NUMBER 6

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The Military Surgeon

Published monthly and constituting two volumes annually.
Volumes commence with the January and July numbers.

Entered as second-class matter January 22, 1916, in the Postoffice at Washington, D. C., under the Act of March 3, 1879.

Subscriptions $3.50 a year for the United States. Elsewhere throughout the world, $4.00. Single copies 40 cents. Subscriptions payable in advance. Checks should be made payable to the Association of Military Surgeons and not to any officer personally.

The addresses of members and subscribers are not changed except upon request. In every case the old as well as the new address should be given. Requests for change of address must reach the Secretary before the twentieth of the month to be effective for the following issue.

Original articles, items of news and matter of interest to the Services are welcomed. Requests for reprints should be made at the time of forwarding articles.

EDITED BY

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Medical Corps, U. S. Army

Colonel JOHN VAN R. HOFF
Medical Corps, U. S. Army (Retired)

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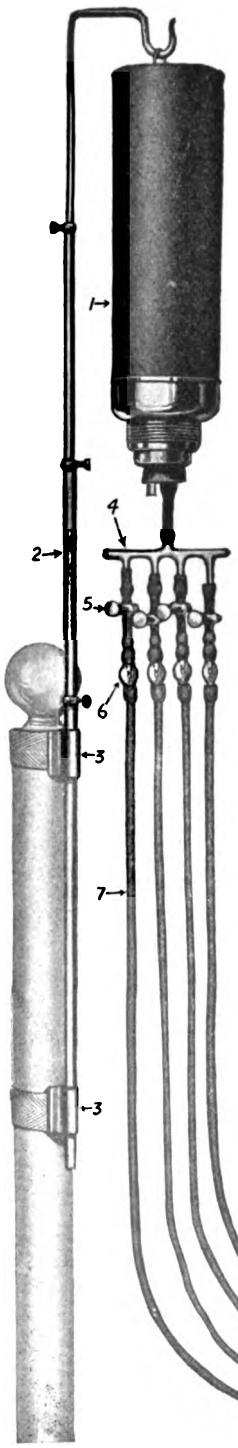

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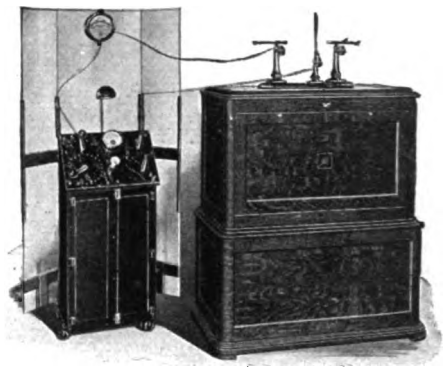

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THE MILITARY SURGEON

VOL. XL JUNE, 1917 NUMBER 6

ORIGINAL ARTICLES

Authors alone are responsible for the opinions expressed in their contributions

THE COLLECTION AND EVACUATION OF SICK AND WOUNDED FROM FRONT TO BASE

BY COL. T. H. GOODWIN, C. M. G., D. S. O.

Army Medical Service

(With one illustration)

[THE MILITARY SURGEON is more than fortunate in receiving permission to publish so much of Colonel Goodwin's wonderfully realistic and instructive lectures, recently delivered at the Army Medical School, as the exigencies of the service will permit.

Col. T. H. Goodwin, Royal Army Medical Corps, has been at the western front since the war began. His actual experience in the field covers every phase of medico-military work, and only now, after almost three years of most active service, has he found time for a short rest to accompany the British Commission to the United States, and tell us, of our Medical Corps, what we must know and do to be efficient in the great work before us.—*Editor.*]

LET us first consider the ordinary daily wastage which occurs throughout the year with every army in the field, and let us, for the purposes of illustration, consider this at a time when very active operations are not in progress.

The normal daily wastage from sickness—apart from wounds—was, prior to this war, laid down as being .3 per cent, *i. e.*, three men in every thousand were daily sent down the lines of communication through sickness.

An average of 70 per cent of an army becomes incapacitated during the first year of a war, *i. e.*, during the first year 14,000 men per division of 20,000 will be passed back along the line.

While the above percentages may be accepted as generally correct, yet, during the present campaign the normal daily wastage from sickness has usually been below the figures quoted.

The general health of the British Army has been uniformly good, and our average wastage from sickness has been distinctly low.

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With regard to this daily wastage from sickness we have noticed that, while a division is occupying the front line trenches there is comparatively little wastage from sickness, yet when this same division is brought back into reserve the daily sick rate rises immediately, the reason being that men are unwilling to report sick while they are in the front line, and defer doing so until their battalion is brought into the back area, when they take the opportunity of reporting sick. There is a general feeling amongst the men against reporting sick, if they can avoid it, while they are in the trenches.

Now as to the methods by which they daily sick are dealt with:

The medical officer, in charge of a battalion, sees the daily sick every morning, and when possible he has a sick parade again in the evening.

Minor maladies, which do not require hospital treatment are marked "Medicine and Duty," which means that the man receives treatment, but continues doing his duty, others are noted "Medicine, Excused Duty," such a case receives treatment and is excused from duty until again seen at the next sick parade.

Cases which are of a more serious nature are, if considered advisable, marked "Hospital" and transferred to the field ambulance for further treatment. The field ambulance, during such a period as we are now considering, sends one or more of its ambulance cars around the front area daily to collect such cases as have been marked "Hospital."

On arrival at the field ambulance, cases will be dealt with according to their nature, some will be transferred forthwith to the "Corps Main Dressing Station," which is in reality a hutted or tented hospital in an advanced position, administered by one of the field ambulances of the corps, detailed for the purpose by the deputy director of medical services of that corps.

After detention and treatment here the cases may be sent back to their units for duty or they may be transferred to the "Corps Rest Station" for convalescence, or, if necessitating a longer period of treatment they may be transferred further back to the "Casualty Clearing Station" which is a unit of the same nature as your "evacuation hospital."

By this means a considerable amount of wastage is avoided, only the more serious cases finding their way back to the Casualty Clearing Station.

We must remember that the whole object of the medical service in war is to provide men for the fighting line, to keep them fit, and, if sick or wounded, to make them fit and ready for further fighting as soon as possible. If all cases, including those of a slight nature, were sent

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down to the base there would be considerable delay in getting them back to the fighting line and consequently much avoidable wastage would take place.

In the clearing of battle casualties, the system for dealing with wounded is as follows: Each battalion has an officer of the Royal Army Medical Corps in medical charge. This officer establishes one or more "Regimental aid posts" in rear of his battalion; such regimental aid posts are in a sheltered position usually in a dugout. The medical officer of a battalion has under his direction sixteen stretcher bearers from the battalion with eight stretchers; this number is frequently doubled before an attack.

The duties of a regimental medical officer are onerous and responsible; he is responsible for the personal hygiene of the men, and is the adviser of the commanding officer on all sanitary matters, while during actual fighting his duties are very heavy indeed and require a cool head, quick decision and prompt action.

Where should be the position of the regimental medical officer while his battalion is in the front line trenches? He should be with, or close to, the commanding officer of the battalion. The advantages of such a position are obvious, the commanding officer is in communication, by telephone, with all the different sections of the trenches, and consequently the medical officer, if close to him, can get immediate information as to casualties in any particular spot, and everyone in the battalion knows where the medical officer is to be found.

It is advisable that he should have the dugout for his regimental aid post in a position near battalion headquarters and also near the main communication trench which runs backwards towards the rear; by this means the wounded can be readily taken back by the stretcher-bearers, to the advanced dressing station.

Now we will suppose that the battalion is ordered to attack, what should the regimental medical officer do? This is a point on which some difference of opinion exists, but the following is my idea as to his correct method of procedure. He should—as far as possible—keep near the commanding officer and move forward with him; if the attack is successful there will be a certain number of wounded in what was "No Man's Land," the ground between the two trenches which has now been taken by the battalion; the medical officer should direct such of these as are able to walk, to go back, taking shelter as far as possible, until they meet the stretcher-bearers of the field ambulance bearer division who are coming up from behind. Those wounded who are unable to move should be placed in shelter—in shell craters, trenches, etc.—and first aid performed as rapidly as possible; they

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will be attended to, and removed, by the field ambulance stretcher bearers on arrival.

The medical officer should not delay here; he must at all costs keep in touch with his battalion and move forward with it. His presence in the newly won enemy trenches will be of immense moral value and he can forthwith set about improvising a regimental aid post, improving shelters for the wounded, attending to casualties as they occur, etc. He should take every opportunity of keeping in touch, by telephone or messenger, with the field ambulance bearer division, which will now, under a pretty heavy shell-fire, be clearing the wounded from the area through which he has just come. Much can be done in this way by sending back short written messages by the "walking" wounded.

The above is only a general outline of what frequently happens during an attack; the actual procedure must, of course, vary with the military exigencies of the moment. The general outline which I should lay down for the guidance of a regimental medical officer would be somewhat as follows: (1) Keep, as far as possible, near the officer commanding the battalion; your position will then be known, and you will be able to keep yourself informed as to any change in the military situation which may be impending. (2) At all costs keep in touch with your battalion; go forward with it, rather than backwards with the wounded. (3) Endeavor by all possible means to keep the medical officers of the field ambulance bearer division informed as to number and situation of casualties, your own position, etc. (4) Keep cheery; your mental attitude will have a considerable moral effect on the men.

Let us now deal with the field ambulance. The bearer division of this unit consists of 3 officers, 3 noncommissioned officers, the wagon orderlies (who, of course, are farther behind with their ambulance wagons) and 27 stretcher squads, each squad consisting of four bearers with one stretcher. Their duties, during such an action as I have described, are of a dangerous and difficult nature, as you may readily imagine and, although I ought not perhaps to say much, belonging, as I do, to the Medical Service, yet I do think that no praise is too high for the way in which they perform their duties.

These young officers, many of them newly commissioned, with men under them, many of whom are little more than boys, go cheerfully and quietly forward into positions which can only be described as unmitigated hell, and carry out the work of clearing the battlefield of wounded.

The men, at all events, are unarmed, and it is essential, for the success of their work, that the officers quietly and methodically direct the sys-

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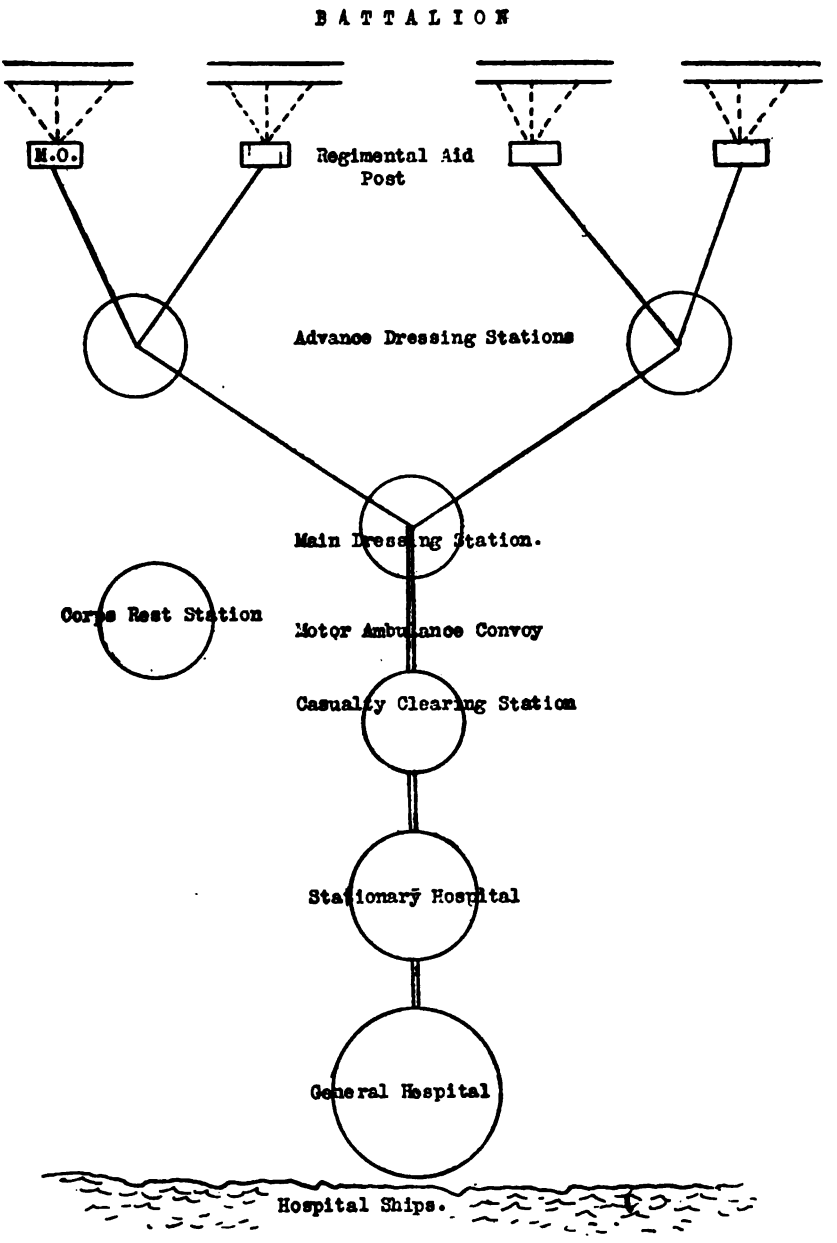

Schematic Diagram of Field Medical Aid.

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tematic clearance of the battlefield. The work, in addition to being dangerous, is extremely laborious, and continues sometimes for twenty-four to thirty-six hours without cessation or pause.

The casualties thus collected are taken back, either direct to the advanced dressing station of the field ambulance, or to the nearest point to which the horsed or motor ambulance wagons can approach. In the latter case the bearers expeditiously load their cases on the wagons and, having taken a corresponding number of empty stretchers from the wagons, they return at once to the collection area.

On arrival at the advanced dressing station the cases are further treated; dressings, where necessary, are re-applied, splints and immobilization apparatus may require adjustment, and the cases are sorted into groups, cases of abdominal wounds are despatched, without the least delay, to the casualty clearing station which has been detailed for the reception of such cases. At this casualty clearing station will be found a staff of skilled surgeons, specialists in this particular branch of surgery, operating day and night on the cases as they arrive.

Cases of a slighter nature will be sent to the corps main dressing station and so on. Every case of wound, no matter how slight, receives an injection of 500 units of anti-tetanic serum; and the fact of this having been done is noted on his tally, so that it is practically impossible for a wounded man to get further back than the casualty clearing station without having received an injection. On reaching the base all cases of wounds of a serious nature receive a second similar injection.

Before I pass on to consider the casualty clearing station, or clearing hospital as it was designated at the beginning of the war, I should like to say a few words with regard to the organization and working of the dressing station of a field ambulance.

It is very necessary to have a clear wide entrance and exit to and from the dressing station, in order that ambulance vehicles may drive in, unload their cases, and drive out without any delay and without obstruction being caused to the vehicles behind. Buildings should always be utilized if possible. The dressing station should be close to a good road leading from the area of operations in front to the casualty clearing station in rear. The dressing station should be divided into sections as follows: (*a*) Receiving, recording and classifying. (*b*) Nursing—here the more serious cases are attended to, and any absolutely necessary operations are performed. Few operations other than those required for hemorrhage and tracheotomies should be performed here. (*c*) Kitchen—hot drinks, soup, milk, etc., are prepared for the wounded. (*d*) Packstore. If buildings are not available it may be

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necessary to use tents. Each field ambulance has twelve bell tents and three operating tents.

Casualty Clearing Station.—This unit is almost invariably situated close to a railway station. The means of transport between the field ambulances and the casualty clearing station is furnished by the motor ambulance convoy, one or more of these convoys are detailed by the Director Medical Service of the Army or Deputy Director Medical Service of the corps to whichever area requires their services.

Each motor ambulance convoy has a personnel of four medical officers and eighteen other ranks Royal Army Medical Corps, 50 motor ambulance cars (20 in section *A*, 15 in sections *B* and *C*), 4 touring cars, 8 motor cycles, and 4 lorries, including one workshop lorry for repairs, so that you see a motor ambulance convoy is a very mobile and well-equipped unit.

By means of the motor ambulance convoy enormous numbers of wounded can be brought from the field ambulances to the casualty clearing stations in a comparatively short time.

On arrival at the casualty clearing station the casualties are further dealt with; a vast amount of operating is performed in these units and at periods when heavy casualties are occurring it will be found necessary to considerably augment the normal staff of seven medical officers. Those cases which, after further dressing or operation, are found fit to travel are sent down by hospital train to the large hospitals—stationary and general—on the lines of communication and at the base, where large numbers of them arrive within twenty-four hours of having been wounded. Here they are kept for a variable time.

Formerly we were able to tranship them to England by hospital ship in large numbers, and did not usually keep cases in France which were unlikely to be fit for duty, or convalescent camp, within three weeks. Nowadays this procedure will probably have to be modified owing to the enemy's barbarous practice of torpedoing hospital ships.

In the stationary and general hospitals, the former usually equipped for 400 and the latter for 1,040 beds, we find the best of modern instruments, equipment, X-ray installations, bacteriological laboratories, etc. When sufficiently recovered from wounds or sickness, patients are drafted to convalescent depots from the stationary and general hospitals.

At all bases are convalescent depots, capable of accommodating 2,000 or more men. The convalescent depots are large hutted or tented camps, with recreation rooms, theaters, cricket and football fields, etc., and the men do graduated marches daily. When their health and strength are fully regained they are drafted back to the fighting line again.

On arrival in England the patients are despatched by hospital

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trains to various hospitals all over the British Isles, according as accommodation may be available, and from these, as they become convalescent, they are transferred to convalescent "V. A. D." hospitals throughout the country.

These convalescent homes are usually large country houses lent by their owners to the government for the period of the war. They are administered by a lady, frequently the wife of an officer at the front, who looks after the catering, supplies, clothing, etc. She has under her a staff of voluntary lady assistants, nurses, quartermaster, cooks, etc. She receives from the government a small allowance per head for each convalescent patient in the hospital to cover the cost of feeding. With good management these homes are remarkably comfortable, and people living in the neighborhood render ready assistance in the provision of cars, etc. A local medical man visits the home thrice weekly or oftener if required, sees the patients and decides which of these are fit to return to duty. When he decides that certain men are fit for discharge these are transferred to depots where they are examined by Royal Army Medical Corps officers, re-equipped, and returned to the fighting area as required.

QUESTIONS AND ANSWERS

Q. Colonel, will you kindly tell us about the organizations of the big hospitals outside of London?

A. I am afraid that I am very much out of touch with conditions in England. Since the war started, I have only been in England for a few days at a time and at long intervals. I understand these large hospitals are administered by a medical officer of senior rank, usually by an officer of the Royal Army Medical Corps on the retired list.

Q. It has occured to me to ask how the medical officer at the front with a battalion manages to look after the average number of injured men that would necessarily fall. Say there are 100 men in the front trench. At least ten of these men will be knocked out, two will be dead; that leaves four severely and four slightly wounded. Then you bring up the remainder of that battalion which comprises about a thousand men. If the same proportion of men are knocked out, you will have about forty or fifty cases to take care of. Now, can the medical officer take care of them?

A. He can do first aid, but he should endeavor to move forward with his battalion. He can, as a rule, place wounded men in fairly good shelter, and if he can do that with every man, he can congratulate himself.

Q. Can he even do that?

A. With fifty cases, twenty-five cases would probably be more or less serious. He cannot manage twenty-five cases, without at least taking 20 minutes. He cannot delay long, as the battalion is probably going into

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the next trench and he must, at all costs, endeavor to be with them and should not remain behind. Unless, of course, there is a case which urgently necessitates his assistance, such as a case of violent hemorrhage, he should, in such a case, do what he can and put him in shelter. You must remember that the bearer division of the field ambulance is coming up, and in five minutes, probably, they will be on the spot; as the attacking troops go forward, the bearer division is coming up. The wounded will then be all collected and left behind in positions of shelter, I grant that it is difficult indeed, but we have to do our best. There has been a suggestion to abolish the post of medical officer with the battalion, but I am personally very much opposed to that.

Q. After your wounded men have reached the casualty clearing station, what procedure is taken as to whether the men should be held or whether they should be sent further to the rear?

A. The receiving department there will be in charge of an experienced officer with a couple of clerks with him. Here the cases are marked according to class; some are sent to the ambulance train and are taken to the other hospitals further towards the base. These officers at the casualty clearing station are very well experienced, and such cases as are likely shortly to recover at the corps resting station are soon filtered out. The principal question to be decided is as to the disposal of the men. This applies to every medical unit, field ambulance, casualty clearing station, or hospital. For example, in a general hospital a "state" is sent in daily, or oftener, showing the number of cases for discharge to convalescent camp, the number for discharge to duty, the number for transfer to England, etc. The officer commanding the hospital then sees all these cases, and if he concurs, the cases are disposed of as marked. The method works exceedingly smoothly and well.

Q. Who judges the cases as to where they should go?

A. The commanding officer comes around to see if the medical officer is absolutely correct, to safeguard the patients.

Q. What do you mean by safeguarding the patients?

A. So that no patients are transferred who should be retained, or the reverse. All doubtful cases would be decided by him. If he cannot make up his mind, then he calls in a consulting surgeon or a more senior medical officer; but personally, I do not think I have ever had to call another man in to decide as to the destination of a patient. The point I had to decide was whether a man should be sent to duty, to convalescent camp, to a special hospital, to England, etc.

Q. Are base hospitals large hospitals?

A. Yes, they are large hospitals, well fitted up, where the wounded can be kept from one to three weeks, if necessary. But you see nowa-

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days, the tendency, as far as possible, is to try and get the cases back to the front as soon as possible.

Q. I would like to ask about the convalescent hospitals in England. Just exactly how are they connected with the Royal Army Medical Corps?

A. They are under government control. They are financed by the government, a per capita grant being given. The labor—nursing, cooking, etc.—is furnished by "V. A. D." personnel, who are paid by the government. The building is voluntarily lent. They are inspected as required by officials appointed by the government.

Q. Is there any special class of cases sent to these hospitals, such as nerve cases, etc.?

A. No. Head cases and nerve cases are sent to special classes of hospitals. Orthopedic cases are under the supervision of Mr. Robert Jones, and they are distributed to certain hospitals with special staffs.

Q. The wounded who are sent to these "V. A. D." hospitals—are they discharged direct from those hospitals?

A. Oh, no. Not at all. They are only finally discharged to France by Royal Army Medical Corps decision, which means no cases are finally discharged except by Army Medical decision.

Q. Speaking of doing away with the medical officer with the battalion—was that due to lack of officers?

A. Yes partly so. There were suggestions to that effect, but I do not think it will be done. The regimental surgeon, I look upon as a very helpful and most valuable man.

Q. Does not the medical officer with the battalion have a certain number of Royal Army Medical Corps men with him in the fighting trench, or in "No Man's Land," to assist him?

A. Yes. He should have, practically speaking, one corporal of the Royal Army Medical Corps and four men with him for "water duties," but those are not always existent as we have not been replacing casualties which occur in that personnel. The medical officer has, of course, the regimental stretcher bearers, but these are not Royal Army Medical Corps men.

Q. How many stretcher bearers with a battalion?

A. There are sixteen trained stretcher bearers with a battalion, sixteen on paper but before an attack the number is generally doubled. The medical officer should be constantly training those stretcher bearers. Before an attack, he will ask the commanding officer for more stretcher bearers if he considers it advisable.

Q. How much personal equipment is a medical officer allowed in the field?

A. He is allowed 35 pounds. A commanding officer on account of hav-

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ing to carry many extra books, etc., is allowed an extra 15 pounds.; ordinary officers, 35 pounds. It is astonishing how much one can take in 35 pounds.

Q. What kind of a revolver must a medical officer carry?

A. He is allowed to carry any revolver, provided it takes government ammunition, the regulation which, is .450 diameter.

Q. Is he allowed to take an automatic pistol?

A. Yes, if he wishes, if it will take .450 ammunition. Personally, I never did; I have always carried the Webley revolver and probably that is why I prefer it.

Q. What is the frontage of a front line trench for a battalion?

A. That varies so much that I cannot lay down a definite rule. I have seen it from 50 yards to several hundred yards.

Q. What of the barrage?

A. In "No Man's Land" you get quite a certain number of your men killed in this barrage fire. It is going on the whole time but it is astonishing the number of men you can get safely back through this, and down through the communicating trenches. Out of a total of 6,000 casualties, you will probably get back 4,000 or 5,000 right away to the casualty clearing station. Some times the wounded have to stay in the front area all day, in dugouts, and then when the fire decreases at night, you get them back. Sometimes it looks impossible, but you manage to do it. It is a great mistake to send the sick back over the open if it can be avoided. Try to get them to take shelter in old trenches and dugouts, and if you possibly can avoid it, do not send your wounded over the open.

Q. How effective are these methods in case of retreat?

A. Then the enemy has got to look after your wounded, just the same as you look after his. That is unavoidable. We take care of the wounded as much as we can without losing our medical personnel. There is no idea of stopping behind and being taken prisoner. They won't let you go if they capture you, and you are too valuable a man to be captured.

Q. How close is the casualty clearing station to the front line?

A. About 6 miles. The advanced dressing station is about ¾ miles and the main dressing station about 1½ miles. These figures are, of course, very approximate and liable to great variation. The casualty clearing station is always in a very good sheltered place, with a very wide entrance and exit so the ambulances can drive right up, unload their wounded, and drive quickly off.

Q. Are there any records kept at the casualty clearing station?

A. Yes, admission and discharge books, and cards for each patient, also, of course, certain other records.

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THE DIAGNOSIS OF TUBERCULOSIS IN THE MILITARY SERVICE

By Colonel GEORGE E. BUSHNELL
Medical Corps, United States Army

THE diagnosis of tuberculosis, especially in its so-called incipient stage, may be said to be at present in an unsettled state. It is often taught that the local lesion in pulmonary tuberculosis can be diagnosticated at an exceedingly early stage and that by so doing an almost certain cure can be effected, that it is negligence to permit the diagnosis to be deferred until râles and tubercle bacilli are present. Hence the search for ultra-refined methods of percussion, the exaltation of the importance of various signs, even the breaking away from physical methods with the claim that more or less indefinite symptoms of ill-health warrant in themselves the diagnosis of tuberculosis. Several erroneous or unproved assumptions vitiate much of the work which has been done along these lines. These are: (1) That the first tuberculous focus accessible to physical examination is the initial focus of the disease in the body. (2) That the disease has not existed previously because not diagnosticated, that therefore, the lesion found is an incipient lesion. (3) That percussion if only practiced with sufficient skill is capable of revealing the existence of an incipient focus of active disease before the advent of râles. (4) That the combination of groups of signs and symptoms which may occur in tuberculosis warrants a positive diagnosis of active tuberculosis, though each group in itself can only justify a probable diagnosis of, or create a suspicion as to tuberculosis.

Now supposing that the methods criticised do indeed lead to the commission of the errors, that active tuberculosis is diagnosticated when no clinical tuberculosis is present and that old and quiescent lesions are mistaken for incipient lesions, what harm results? Manifestly that the patients are obliged to give up work, to spend money that they can ill afford to undergo unnecessary treatment, to incur the stigma of a disease which causes them to be shunned by the ignorant, that sanatoria are filled with patients who do not need the treatment perhaps to the exclusion of others who do, that the statistics as to methods of treatment and to the curability of the disease are vitiated.

That errors are committed extensively in the diagnosis of tuberculosis is shown by recent utterances in Germany. Meisser (1) says that the fear of being regarded as a poor diagnostician leads to the making of the diagnosis of tuberculosis on uncertain and slight indications.

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This is the reason why, according to Roepke, 10 per cent of the inmates of German sanatoria are not tuberculous. The percentage, Meissen says, may be considerably greater. At Sanatorium Lyster in 1914, in 124 of 312 patients tubercle bacilli were never found (2). Fraenkel (3) is reported to have remarked that the reason for the errors in the diagnosis of tuberculosis lies, he believes, in the fact that too great value is placed on relatively insignificant findings. Freidrich v. Müller (4) says: "I know not a few cases in which patients have been treated for years for dullness of the apex and have even been to Davos, the autopsy showing normal apices." The writer has been surprised in his professional experience to see upon what slender basis the diagnosis of pulmonary tuberculosis is often made. Now in civil life it may be admitted that in certain cases the guarded diagnosis of pulmonary tuberculosis upon insufficient indications may not be without its justification. The argument would be somewhat as follows: the patient is not well, sanatorium treatment or rest and change of air would benefit him, it is necessary to frighten him to induce him to take care of himself, he is abundantly able to undergo the expense, etc., etc. But in military practice the case is quite different. Here it is just as important to know when tuberculosis does not exist as to make the diagnosis when the disease is present. The examiner's duty to the Government requires him not only to exclude from the Army men who will cripple its effectiveness and help to swell the pension list, but also to do his part to hold to service those who are not afflicted with manifest disability. It will also be his duty to decide as to the presence or absence of tuberculosis in those about to be discharged and to determine whether or not tuberculosis exists in those recently enlisted, and if it does what the probability is as to the disease having been incurred in line of duty or before enlistment. The present situation is furthermore one of peculiar difficulty for the civilian examiner who is wont to accept the statements of his patients at their face value, for among the men whom he will examine for entrance into the military service there will be many of two classes: first, the class of men who know or suspect that they have pulmonary tuberculosis but wish nevertheless to volunteer and are accordingly disposed to conceal their past history and present symptoms. (One must always be prepared for the possibility that consumptives attempt to enlist solely in order to secure treatment and pension.) Second, the class of men who, when it comes to conscription, desiring exemption will be tempted to claim symptoms and to give a history calculated to mislead the examiner. At the present juncture it is of importance that cases of active pulmonary tuberculosis shall not be admitted to the Army, not only on account of the efficiency of the Army but also to spare the future pension list. And it may become

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equally important that men who should serve their country shall not be permitted to escape their responsibilities by false statements as to their physical condition.

It may then be laid down as a first principle that the examination must be confined to objective fact, to physical diagnosis. The examiner may indeed listen to the applicant's story, but should not give weight to statements not supported by physical signs. It is usually the case that the diagnosis of pulmonary conditions suffers from the sins of omission of the examiner rather than from a too minute attention to unimportant variations from the assumed normal. In fact not much can reasonably be expected of the examiner in the pressure which attends the enrollment of a large army. There is need of haste and the surroundings are often unfavorable for the practice of auscultation and percussion. All that can be demanded is that cases of well-marked manifest tuberculosis shall be detected. There is need of a standard on the one hand to prevent unnecessary rejections for too slight causes or from misapprehended physical signs; on the other hand to guide the hurried examiner and help him to bear in mind conditions which should lead to rejection, yet may easily be overlooked. A standard, if authoritatively adopted, is moreover a great moral support to the examiner, since it relieves him from the responsibility of decision as to the weight which is to be given to the signs which he detects; it tends also to the rendering of justice by favoring equality as respects the treatment of the applicants at the various recruiting stations. The present paper is intended as a contribution to the difficult subject, the principles which should govern in the examination of the recruit in deciding as to the existence of pulmonary tuberculosis in a form that incapacitates for military service.

The most vexed question is; what is the significance of lesions of the upper part of the upper lobe which are not accompanied by rules? All will admit the frequency of old arrested lesions without râles in this part of the lungs. The point chiefly debated is; are there physical signs which enable the diagnosis of truly incipient tuberculosis of the upper lobe to be made before rales are present? Laennec thought that there are no such signs, that rales were the first indication of the presence of a new focus. Grancher taught that changes in the breathing became apparent before the focus softened and produced moist sounds. His writings have influenced strongly the later authors. Study of properly taken radiographs forces the student to agree with the teachings of the more advanced radiologists who claim that the tuberculous process begins at the hilus, in childhood usually, and spreads through the lung as a peribronchial process, often limited permanently to the

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deep lung, in less fortunate individuals reaching the periphery and giving rise to clinically manifest tuberculosis. In the vast majority of cases such clinically manifest tuberculosis appears first at the surface of the upper lobes. Radiographs show every stage and all possible variations as to the extent of the process. We see tuberculosis ascending upward and checked while still in the deep lung, or lines terminating perhaps in healed apical foci which have not reached the surface of the lung and are still too deep and too minute to afford certain signs. Again we find lesions that have involved the cortex and have produced a probably at one time manifest and active tuberculosis, which is now arrested, the process having run its course without the knowledge of the subject. And of course we find also lesions of the upper lobe distinctly traceable from the hilus in all stages of present activity. There seems to the writer little question that the manifest tuberculosis of the surface of the lung which the clinician once called the primary lesion of the disease is a relatively late development, that it frequently heals, that the manifest disease at the time that we discover it is frequently a recrudescence or an extension from older attacks. There is therefore no reason why small and obscure lesions of the upper lobe, as truly as large lesions, may not be old lesions, the difference simply being that in the one case the disease has not been brought to the attention of the subject; in the other he has been only too conscious of the struggle against it. This view is not only the one that is most readily accepted as the result of study of radiographs, it is also the one which best harmonizes and coördinates the facts known as to childhood tuberculosis and the results of animal experimentation. We may then properly inquire, with regard to even the smallest and most obscure of manifest lesions, whether changes in percussion and breath sounds, and other special signs, are signs of a new or of an old tuberculosis?

Everyone will admit that old, dry lesions of the lung exist and that they are recognized by the following signs.[1] Dullness on percussion and a respiration characterized by a harshness of quality (broncho-vesicular, rude, verschärft) and a prolongation of expiration. The old dry lesion is a contracting, relatively airless lesion. The preponderance of solid tissue leads to relative dullness and to an increased conductivity of the sounds from the bronchi. Hence the broncho-vesicular quality of the respiration and the prolonged expiration, both due to the fact that the sounds transmitted by the bronchi reach the surface of the lung more distinctly than is normally the case. The increased conductivity may be due solely to the relatively airless condition of the lung involved. This is shown by a simple experiment: Take the lungs, with trachea at-

[1] For simplicity cavity signs are not here considered.

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tached, of a freshly killed pig or calf. Cut off one lung leaving its main bronchus as long as may be. Insert the nozzle of a small bellows into the trachea and tie it in. Close the cut end of the bronchus of the severed lung and work the bellows. Its operation partially inflates the lung, which rises and falls with the working of the bellows. On auscultation with the stethoscope a sound which is, of course, the sound of the bellows conducted through the lungs, gives a passable imitation of normal breathing. Now open the end of the severed bronchus, continuing the operation of the bellows. The air now escapes in great part through the opening thus provided. The lung collapses to a considerable extent and only slightly expands under the impulse of the indriven air. The respiratory sounds are still to be heard, but their quality has changed, there being an increased harshness of inspiration and a marked prolongation of expiration. The sounds from the bronchi, of the same loudness as before, are no longer muffled by the presence of countless inflated air cells and reach the ear with much greater distinctness.

The increased conductivity may also be due solely or in great part to increase in fibrous tissue. This is illustrated by a recent case. An old man, for many years an inmate of the hospital at Fort Bayard as a beneficiary of the Soldiers' Home, has just died of cardio-renal disease. Although the sputum has always been negative for tubercle bacilli the case has been considered to be one of pulmonary tuberculosis, that is, while the presence of other disease was recognized the patient has been regarded as having pulmonary tuberculosis also to an extent which justified his retention in an institution devoted to the treatment of that disease. There was some difference of opinion among the various examiners as to the extent of the pulmonary disease, some giving undue weight to râles due to other causes, but all agreed that there was an old lesion at the right apex characterized by harshness of breathing and prolongation of expiration and the presence of râles. At the autopsy the lung at this point was adherent by firm and old adhesions. The apex beneath the adhesions was slightly puckered and contracted and there was a small increase of fibrous tissue. The lungs presented no other macroscopic evidence whatever of tuberculosis further than enlarged firm hilus glands. Here the pulmonary adhesions connecting directly with the framework of the lung constituted themselves a speaking tube to transmit more distinctly than normally the sounds of the bronchi. The moist sounds illustrate the bronchial catarrh beneath adhesions of which Bang (5) speaks. We may say then that in chronic lesions the broncho-vesicular quality of the respiration and the prolongation of the expiration are due to the increased conductivity of

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the lung caused by relative airlessness and to increase of fibrous tissue, both factors in varying degree being generally present.

Of course any condensation of the lung tissue will produce the same result in a more or less marked way according to its nature. The consolidation of pneumonia produces a typical bronchial breathing with prolongation of expiration; in fact the signs are present in this condition in a degree of perfection that is practically never encountered in pulmonary tuberculosis. There is a tuberculous pneumonia. We may encounter this as a comparative rarity and watch it pass through its various stages. But it is a relatively late condition, the result of the confluence of formerly discrete foci, and generally terminates in caseation and cavitation. The patient usually is febrile and unmistakably ill. The process, moreover, is accompanied by an abundance of moist sounds of a character which varies with the stage. For our present purpose, which is the determination of the signs which demand the rejection of the afebrile ambulant subject from the military service, the fact that bronchial breathing is found in tuberculous pneumonia may be disregarded. It remains to inquire whether the physical phenomena which we have ascribed to increased conductivity may be produced in any other manner. Undoubtedly an exaggeration of bronchial sounds by noisy breathing, in which there is an actual prolongation of expiration, may be conducted to the examiner's ear and simulate the conditions which have been described. This is a point to which attention should be paid in examinations. Whether the same or similar phenomena may be produced by other morbid conditions than those considered is another question. Goldscheider says that bronchitis may cause a sharpened inspiration but only on the condition of increased activity of respiration; however, as he goes on to say, we cannot conceive of a localized bronchitis as the cause of this phenomenon. Grancher thought that the harshness of inspiration which he regarded the first sign of incipient phthisis was due to minute if not microscopic tubercles at the junction of the respiratory bronchiole with the alveolar passages, which by their presence and by the swelling caused by them effected a partial obstruction of the air current and hence an alteration in the sounds of inspiration. Others have attempted to explain the alterations in respiratory sounds by swelling of the mucous membrane of the bronchi with resulting partial obstruction. The subject is too large to enter upon here in detail. It suffices to say that the various explanations offered are either, like that of Grancher, based upon an obsolete pathology, or err in ascribing too great activity of inflammation to chronic tuberculosis. The tuberculous process in the class of cases under consideration so rarely develops acuity of inflammation that the

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possibility of confusion from the presence of the latter may in practice be safely neglected. This is particularly true of the so-called incipient tuberculosis of the apex in which minute attention to respiration is supposed to be capable of detecting the earliest changes. It is a singular fact that even those who describe breath changes as the earliest signs admit that the same changes are present after the case has become chronic. Thus Grancher, after stating that the earliest signs of an incipient lesion are first harshness of inspiration, then harshness of expiration, followed by prolongation of the latter, goes on to say that these signs sometimes persist for a long time. If Grancher's views were correct it would therefore be probable that the lesion would be encountered most frequently in the chronic stage. Goldscheider (6), analyzing a series of cases of apical disease, says that it is impossible to discover any relation between sharpened inspiration and catarrh, and that the pathological change which was regularly present was induration of the apex and further that a connection between prolonged and sharpened expiration and catarrh is improbable. Râles and crepitation were often found by him without changes in expiration. He often observed, he says, that expiration was prolonged or sharpened on the side of the greater dullness but not on the side of the lesser dullness (*i. e.*, these signs are found more marked over the lesion which is the more indurated, therefore probably the older). He considers that it follows from his observations that sharpness of inspiration and prolongation of expiration depend upon induration of lung tissue.

The writer agrees with Goldscheider that rales and crepitations are often present at the apices unaccompanied by alteration in the character of the breath sounds, which dissociation is usually evidence of a quite recent lesion. With regard to percussion, of which some writers expect so much at the present time, Grancher says (7): "One should not demand of percussion more than it can give. It is, in fact, a somewhat gross procedure from which one should expect only summary and simple information. So many causes, in fact, can modify the sonority of percussion—the position of the percussed finger, the mode and force of percussion, the time of respiration and even the position of the patient —that if in practice we busy ourselves with nuances we shall do a futile thing. Add to these considerations the fact that often a serious pathological condition of the lung produces no appreciable change in the normal resonance." Meissen expresses a similar opinion. He says,(8) speaking of Waller's method of percussion: "In such finesse of percussion, as well as of auscultation, it is now recongized that our physical diagnosis, speaking strictly, is a very coarse procedure which cannot possibly give certain information as to slight changes." The writer agrees

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in general with the above views. But conceding the ability of the expert to detect minutest changes in condensation at the apex, the most serious objection which can be brought against his methods, in the writer's judgment, is their frequent misuse. It is the fashion today to assume that the presence of dullness at the apex is an important and early sign of the incipient lesion. But so far as such dullness is due to pulmonary disease in the class of cases under consideration it is a sign merely of induration of the lung. We have seen that there is reason to suppose that, usually, say in nineteen cases out of twenty, induration or condensation at this place is evidence of increase of fibrous tissue, that is, of an old lesion, not of an incipient lesion, and that with regard to the twentieth case it is one that is not likely to be considered for enlistment. We affirm then that in practice it is the rule that dullness at the apex is not an early but a late sign of pathological changes. A similar view is held by Schneider (9) who says: "The first signs of apical tuberculosis are not to be expected from percussion but from auscultation." Cabot (10) states that in the earlier stages of incipient tuberculosis there may be no recognizable physical signs. The earliest physical signs are fine crackling rales. Osler (11) says that feeble breath sounds are the most characteristic early signs. The expiration is usually prolonged. In other cases the earliest sign is a harsh rude respiratory murmur. With regard to this statement it may be remarked that enfeeblement of respiration without other morbid signs means simply that the lung does not breathe as freely as it should, in other words, pleural adhesions are present—a sign usually of an old lesion. In the absence of other signs, similarly, from the writer's standpoint, the prolonged expiration and the "harsh, rude respiratory murmur" are generally evidences of an induration. In general, prolonged expiration and harshness of respiratory sounds are characteristic of the dry lesion. But râles, and indeed râles which seem those of recent inflammation, may be present with these signs. There is no reason why we may not have an old lesion with its classical signs, within which there has been a recrudescence of activity of the tuberculous process so that it may be called, so far as acuity is concerned, a mixed lesion. We shall never understand apical tuberculosis until we are prepared to accept the view that there may be more than one exacerbation in that region, that the lesion which we detect is not by any means necessarily an incipient lesion, even though minute and obscure. The tuberculous process in its stealthy advances sometimes spills over, so to speak, from the deep lung producing a superficial lesion. The immunity of the patient rises, the tide of disease recedes, the superficial lesion heals, to be detected finally by the changes in respiratory sounds chiefly, and to be

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considered only too often an active rather than an obsolete process. Or again what we have called the tide of the disease, which is, less figuratively, the increase of inflammatory lymph from the deep peribronchial process, again rises and with higher waves and inundates once more the apex producing now more easily perceptible signs, a collection of signs some of which proceed from the old and others from the recent pathological process, a "mixed" process in the sense in which that word is used above.

The earlier manifestations of the pathological process set forth above were long ago described by Bard under the name of abortive tuberculosis of the apex. The writer is inclined to grant a frequent benignity to apical tuberculosis and to suppose that many of the so-called non-tuberculous indurations of this region are really *ab origine* tuberculous.

With regard to the general subject under consideration let us cite the views of some of the French authors. Bezançon (12) says: Diminution of the respiratory murmur, localized and constant at one apex, is a probable sign of tuberculosis, not of incipient tuberculosis but of latent, torpid, attenuated tuberculosis. Bard remarks (13): "The greater part of the signs which Grancher gives as relating to incipient phthisis apply much more exactly to abortive lesions. Most frequently the existence of abortive lesions is not revealed until their activity is a thing of the past. It is important to be on one's guard against confounding slight with incipient lesions." Piéry in his brilliant treatise on pulmonary tuberculosis considers diminution of the vesicular murmur and jerky respiration as due to attacks of recurrent pleurisy which has produced partial pleural adhesions in the first case and has left a roughened pleura in the second. He remarks: "At the risk of contradiction we would say that the only early stethoscopic signs are râles." And further he says: "The error of the last thirty years has been to attribute to an incipient tuberculosis what in reality proceeds from an old attenuated, or abortive tuberculosis. From this error have sprung eminently disastrous results in the field of practical medicine."[2]

Perhaps the best proof that the foregoing is correct, or more accurately that the view that incipient foci are to be detected prior to the advent of râles is wrong, is afforded by the following considerations.

[2] It is interesting to note the present position of German diagnosticians under the pressure of war conditions. Goldscheider (14) says: "Only active cases of tuberculosis from the Army should be taken into sanatoria, such as show fine râles. "Insufficient to establish an active process are rough breathing, sharpened breathing, slight apical dullness. The Berlin letter already quoted above states that the need for men has made it necessary to accept for enlistment persons with healed or inactive tuberculosis, but many of them have made excellent soldiers. Open cases of tuberculosis or such as give evidence of an active process must be exempted from military service. On the other hand old inactive cirrhotic forms can under certain conditions be regarded as fit for military service. It will be noted that the quotation from Goldscheider fully supports the position of the writer, namely, that the activity of a tuberculous process is, in military practice, to be determined solely by the presence of moist sounds.

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It is generally recognized that early miliary tuberculosis cannot be detected by the aid of physical signs. Frederich v. Müller (*loc. cit.*) says: "It was pointed out in a discussion on the X-ray at Berlin that we cannot detect fresh tubercles in the lungs (*i. e.*, by means of the X-ray), with the same disappointment that Laennec and Skoda felt when they recognized the fact that *even an extensive miliary tuberculosis presents no perceptible signs to auscultation and percussion* (italics mine)." It is frequently observed that the size of tuberculous foci is found at autopsy to be greater than that determined during life by clinical methods, there being recent extensions of the tuberculous process which have escaped detection. Now if the numerous foci of miliary tuberculosis and the recent small foci surrounding an old lesion cannot be discovered in their early stages, what authorizes us to believe that it is possible to detect the *incipient* lesion of the apex by auscultation and percussion before râles have made their appearance?

RALES

For an understanding of the writer's point of view it is necessary to say a few words on the subject of râles before describing the tuberculous lesions which will be encountered in examinations of the recruit. A complete discussion of the various kinds and the significance of râles would be too extensive an undertaking for the limits of this paper. A brief sketch in which attention is called to a few points is all that can be attempted. The râle in the strict sense is the sound produced by the movement of air within the lungs in the presence of fluid. A dry râle in the literal sense is a misnomer. Either fluid is present or the sound merely simulates the true râle. Râles are of two kinds: râles of acute inflammation and râles of congestion, chronic inflammation or chronic irritation. The acute inflammatory râles of tuberculosis are those which accompany tuberculous pneumonia. They are the classical crepitant and subcrepitant râles of pneumonia in general. It is not necessary to describe the crepitant râle. The subcrepitant râle is equally familiar, but one point should be insisted on. To denote a pneumonic process the râle must be fine, occur in showers during inspiration only, and they must all be of the same size, that is, the râles that occur in showers must all be alike. But the pneumonic process may develop in a region in which other râles are present. Occasionally râles are heard in showers in large moist lesions which may for that reason be mistaken for the true subcrepitant râle, as, for example, in a large fibrocaseous lesion of the lower lobe with pleural adhesions which keep it nearly motionless in ordinary breathing. Let the patient suddenly breathe deeply or breathe and cough and the moisture discloses its presence by showers of râles which may appear to be small and of

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equal size. But they are always larger than the true subscrepitant râle and after the moisture has been disturbed by repeated inspirations the shower effect disappears. Râles which accompany inflammatory or irritative conditions of less acuity than that of tuberculous pneumonia we will denominate indeterminate râles. They differ from the inflammatory râle in that they have no fixed place of origin, no fixed size and are not connected with any definite period of respiration, though more commonly found in inspiration. They are produced by the movement of air through tubes or cavities in which moisture is present and vary according to the size of the container and the amount and the degree of viscosity of the fluid. Usually the indeterminate râle is, as to place of origin, a bronchial râle, as the subcrepitant râle may be called the râle of the bronchiole and the crepitant râle the râle of the alveolus. The important point is that the indeterminate râle is the râle of the chronic stages of tuberculosis. Nothing is more surprising than the failure of many examiners to consider the age of the tuberculous lesion. It is not uncommon to see afebrile or nearly afebrile patients who have been condemned by their physicians to a speedy death in whom the tuberculous process was of an eminently chronic nature and who as a matter of fact live many years after the rendering of the fatal prognosis. The subject is too large a one to consider here in its entirety. What interests us particularly in this connection is the question as to the significance of râles occurring in small manifest tuberculous lesions or in what are suspected to be tuberculous lesions. In the first place the presence of typical crepitant or subcrepitant râles is undoubtedly cause for rejection: there is not only a tuberculous lesion present but that lesion is in an active state. Likewise the indeterminate râle if abundant and easily heard is an indication of a lesion of sufficient activity to demand rejection. On the other hand the so-called atelectatic râles of the apex (râles heard on the first full inspiration after quiescence and not repeated in subsequent inspiratory acts), whatever their mechanism may be, are not evidence of an active tuberculous process. Doubt will sometimes arise as to the so-called dry râle. As has been remarked, a dry râle is a misnomer. The causation of the sound thus denominated is obscure, but there is no doubt that it does not indicate active tuberculosis, being heard in patients who remain under observation for many years without developing any active process. In men of apparent vigor such sounds may be disregarded in the absence of other signs. Sometimes vigorous men during the course of a common cold will show rather faint râles at a point in the back below and near the angle of the scapula. These râles usually occur symmetrically on both sides and are distinguished from tuber-

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culous râles by this fact and by the absence of changes in percussion note, breath sounds and transmission of voice. In cases of doubt the examination of the subject should be deferred. Occasionally scanty, rather coarse, mucous râles persist for a long time in lesions which are old, fibrous and practically obsolete, the subject being in apparently vigorous health. Here the râles are not necessarily true tuberculous râles. They may denote moisture effused in a damaged area from causes other than tuberculosis, *i. e.*, arthritism, as shown by the fact that they are sometimes caused to disappear by a course of Carlsbad salts or other purgative. We are here, however, on debatable ground. The candidate should be rejected unless his qualifications make him especially desirable for some special duty, in which case note should be made of the condition and authority to waive it obtained. Sounds resembling râles, known as marginal sounds (15), are frequently to be heard in the healthiest men at the base of the lungs during inspiration, especially in the axilla. They are sometimes heard only upon one side, sometimes upon both sides. They are caused by the separation of the pleural surfaces as the edge of the lung penetrates into the complemental space and are not of pathological significance. They are distinguished from true râles or friction sounds at this location, with both of which they are frequently confounded, by their strict limitation to the border of the lung and by the absence of other signs and symptoms.

During strong respiratory movements and especially after cough the bending of the sternum produces fine crepitations which may be propagated a short distance to the surrounding lung, or, more frequently, reach the observer's ear if the stethoscope touches the edge of that bone. These are not often mistaken for signs of disease. More liable to cause mistakes are sounds originating in the costo-sternal articulations. These occur in a most marked degree in athletic men, strong breathers, who have perhaps strained the articulations of the thorax by violent exercise. The sounds sometimes much resemble moist râles, but may have a more "bony" quality. Being occasionally propagated several inches along the rib their determination requires care (16). Of course the absence of other signs and the health of the subject should put the examiner upon his guard.

THE NON-ADVANCING, SHARPLY DEMARCATED CHRONIC TUBERCULOUS FOCUS

Percussion shows dullness which stops abruptly at a certain level. The line below which the note becomes normal can be drawn accurately. Mark this line and it will be found that râles, if present, are heard down to it and not beyond it. Vocal fremitus and resonance, increased

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above it, return to normal below it. The more marked the dullness the older the lesion; the sharper the line of demarcation between dullness and normal resonance the longer the time during which the lesion has ceased to advance; the harsher the respiration and the more prolonged the expiration the greater the amount of condensation, the older the lesion. The drier the lesion the less is its activity. The râles, usually elicited with difficulty, as only by expiration and cough, are indeterminate râles. If the lesion is absolutely dry it may be called arrested. Such a lesion implicates especially the superficial lung, the sharpness of demarcation being due to fibrous encapsulation, the distinctness with which the auscultatory sounds are perceived being probably due to the presence of pleural adhesions which bind the parenchymatous fibrous tissue of the lung firmly to the thoracic wall. It is not infrequently complicated by the presence of a cavity. As above described the lesion has been one of sufficient intensity to make it probable that there is considerable deep tuberculosis. It is, therefore, a cause for rejection even though absolutely dry.

THE ADVANCING, CHRONIC, TUBERCULOUS FOCUS

The advancing chronic tuberculous focus is characterized by dullness which shades into normal resonance, by râles which extend below the zone of dullness, by a lack of correspondence as to level between the percussion note and the transmission of voice. The râles heard may be all indeterminate, or indeterminate above and subcrepitant below, indicating then pneumonic extensions below an older lesion. Such a lesion is, of course, a cause for absolute rejection.

The superficial lesions just described are the result of a failure of immunity during the original extension of tuberculous lymphangitis to the apex, which has led to the development of numerous superficial parenchymatous tuberculous foci, discrete and small foci of tuberculous pneumonia. If they remain discrete they may become arrested and clinically the signs of fibrosis predominate. If they coalesce in their entirety or in part by reason of a secondary caseous pneumonia a cavity forms. With return to a relatively high immunity the sharply demarcated lesion results.

THE DEEP, ACTIVE, PERIBRONCHIAL LESION

But in some cases the failure of immunity shows itself not by the development of a localized pneumonic process but by the conversion of the tuberculous lymphangitis into what is usually called peribronchial tuberculosis, but which more accurately is a series of peribronchial invasions of the parenchyma, a ring of tuberculous pneumonia about

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the bronchi. This process varies in severity. The more severe forms do not concern us at present. The less severe forms are capable of arrest but are dangerous because not readily localized, and difficult of diagnosis on account of the obscure physical signs which they present. In the advanced consumptive we generally find a cavity with old fibrosis above and peribronchial extensions of a secondary nature, the result, that is, of later exacerbations, below. But in the young adult the process may be confined to the deep lung. In cases of men at all eligible for enlistment by reason of apparently fair health the process will be largely limited to the paravertebral region. It may give no signs of its presence. It may be suspected by the presence of indistinct râles which seem distant, found perhaps in the second and third interspaces anteriorly near the sternum. In its progress the process ultimately develops the classical apical tuberculosis or may instead produce superficial lesions at the summit of the lower lobe which may extend down the edge of the lower lobe and appear as pneumonic foci or cavities near the inner edge or under the angle of the scapula, a region which should be carefully examined in the young especially. Another common form is peribronchial extension in the side opposite to the primary superficial lesion. When the second lung is involved the process may be that of the typical superficial lesion, but it may also take the form of peribronchial tuberculosis. Superficial examination detects the primary lesion. The other side appears to be normal, but on expiration and cough moist indeterminate râles are heard perhaps over the entire anterior surface of the lung extending into the axilla. The only other sign present may be high pitched "short" percussion note. Such cases are likely to escape attention if the method of expiration and cough is not employed. They are of course to be absolutely rejected. Peribronchial extensions to the lower lobe result rarely in extensively disseminated and numerous deep small foci which manifest themselves to clinical examination only by a high pitched "short" note on strong percussion, by increased vocal fremitus (sometimes only produced by sounding a deep bass note) and sometimes by indistinct distant râles. In the more marked cases there is also a characteristic loss of expansion of the affected side, the deep lung being too stiff to expand freely. The X-ray throws much light on this class of cases which may otherwise escape detection. In view of the difficulties which attend the rapid diagnosticating of such cases, it is a good rule to look with suspicion upon cases in which the subject shows constitutional depression, marked signs of ill health, with only a small and apparently unimportant superficial lesion. If the general condition is impaired to a degree disproportionate to what might be expected from the manifest lesion it is not unlikely

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that there is a well-marked, deep tuberculous process, a supposition often confirmed by the radiograph.

THE CHRONIC, HEALED PERIBRONCHIAL TUBERCULOSIS

Hitherto we have considered only the signs of peribronchial tuberculosis in an active state. But this disease in its less severe forms often heals leaving changes in the lungs which are not infrequently misinterpreted. Tuberculous peribronchial lymphangitis may be said to heal invariably, that is, if the tuberculous process is one of any marked acuity it will pass beyond the lymph channels and invade the parenchyma. Confinement of the tuberculosis to the lymph channels of the peribronchial tissue is therefore a sign of a high immunity or, if you prefer, a benign form of the disease.

The X-ray frequently shows in the cases of apparently healthy persons thickening of the bronchi, though no active tuberculosis may be present. The tuberculous nature of the thickening is demonstrated with great probability by the presence of more or less sharply marked dots in the network of the lines. There are, however, many cases in which the dots are scanty or absent, while the characteristic restriction of the abnormal opacities to the paravertebral region of the upper lobe justifies the assumption that the process has been of a tuberculous nature. We infer, then, that in such cases the thickening of the lines has been due to a tuberculous lymphangitis now healed or quiescent which has led to the formation of fibrous tissue in the peribronchial tissue and to a fibrous thickening of the outer coats of the bronchi. No doubt the process frequently advances to the formation of true tubercles in the peribronchial tissues which also become obsolete in persons of high resistance. However that may be, the tuberculous process has produced a sufficient induration in the vicinity of the air tubes to permit the transmission with greater than normal distinctness of the respiratory sounds in the bronchi in cases in which the fibrous tissue advances nearly or quite to the surface of the lung. The result of the indurative process is the production of broncho-vesicular breathing over the part affected. The process may be entirely obsolete or may be still active; all that the broncho-vesicular breathing shows is the presence of an induration. The question of activity is determined by the presence or absence of râles. If disseminated râles are present the examiner need go no further in order to decide upon rejection. The cases, however, that present the greatest difficulty are those in which the lung is dry. We have to decide what bearing broncho-vesicular breathing has upon the acceptance of the applicant. Sometimes this breathing is found in men of apparently excellent health, as, for example,

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a case which came recently under the writer's notice. An officer of middle age, ruddy and tanned, in good flesh, with strong muscles, presented himself for treatment for tuberculosis. The diagnosis of tuberculosis had been made in 1911, but he had ignored it, had served a tour in Alaska and afterwards returned there for a hunting trip and had been on full duty ever since, part of the time on the border in command of a battery of field artillery. An operation for removal of the tonsils in February, 1917, led to an examination of the sputum and tubercle bacilli were found in it. There were well-marked signs of active but not recent tuberculous lesions in both upper lobes. Auscultation showed harsh breathing and prolonged expiration over almost the entire right lung anteriorly and over the greater part of the left lung. Posteriorly the same breath changes were found down to the vicinity of the seventh dorsal vertebra on both sides. In view of the good physical condition of the patient and of the fact that they extended to about the same level on both sides it seemed improbable that these breath sounds were of much significance, but the radiograph showed heavy streaked shadows extending throughout almost the entire lung. Here was a case of peribronchial tuberculosis, a fibrosis, which had developed to an enormous extent and gone on to healing, without interfering with the patient's work or play for a single day until, at least six years after the incipiency of the tuberculosis, the disease was discovered almost by accident during an exacerbation in the parts of the lung most severely involved. Similar findings, usually less extensive, are not infrequent in soldiers from the Philippine Islands, whose condition is discovered as a result of hemoptysis or of sputum positive for tubercle bacilli, but who on arrival at Fort Bayard may be found to have already arrested the activity of their disease. Slight changes in the breath sounds accompanied sometimes by slight alterations in the pitch of the percussion note are the only physical signs of a process which, though healed, is always to be taken seriously and should, if extensive, constitute a cause for rejection. The typical lesion of the consumptive, the well-marked focus of the upper lobe, is by origin a broncho-pneumonia developed in the extension of a deep peribronchial tuberculosis. The deep tuberculosis may become arrested and the superficial focus may become strictly limited or it may extend downward through the superficial lung. But on the other hand the peribronchial tuberculosis may extend, sometimes benign, sometimes most acute and fatal, through the other parts of the affected lung or of both lungs. We must be prepared to expect every possible variation as respects the extent and severity of the process. We must also be prepared to diagnosticate it on seemingly slight grounds, disseminated

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rales in the acute process, the breath sounds already described in the healed process, with slight change in the percussion note, both signs, with dullness on percussion, in the active chronic process. Failure to understand and recognize peribronchial tuberculosis as a more or less independent process as well as a concommitant of the localized superficial lesion is one of the commonest of the mistakes made in the diagnosis of tuberculous lesions.

TUBERCULIN

It is well recognized that a positive reaction to tuberculin, especially in the young adult, is not a proof of the presence of active, clinically important tuberculosis. Tuberculin only demonstrates activity of the tuberculous process in the clinical sense when it can be shown to produce a focal reaction. Such reaction is not without danger. One indication for the employment of tuberculin which is always understood but not always set forth with the distinctness that is desirable in so important a matter is that the physician who uses it should be capable of an exact diagnosis of the pulmonary condition in order that he may not use it under conditions where fatal harm may ensue. Nothing is more dangerous than to place so powerful a reagent in unskilled or careless hands. Since, therefore, tuberculin rarely leads to a correct diagnosis and may do injury its general use in the diagnosis of tuberculosis in examinations for enlistment should be prohibited.

X-RAY

Only well-marked pathological changes are revealed by radioscopy. For the accurate diagnosis of tuberculosis recourse should always be had to the study of the X-ray negative. It is not, of course, practicable to use radiography extensively for the determination of tuberculosis during the examination of recruits. But the X-ray will doubtless be often employed in doubtful or disputed cases so that it is necessary to consider the rules which should obtain in reading the radiograph.

"As Cohn says, morbid changes in the lungs are shown by shadows due to two substances: first, blood; second, fully organized connective tissue.(17) Blood imprints a shadow on the negative only when present in abundance. The congestion of lobar pneumonia is typical. Bronchopneumonia of tuberculous origin may also cast shadows, but only the process is acute, the congestion great. Frequently the tuberculous process runs so chronic a course that the inflammatory reaction is insufficient to congest the lung enough to produce a shadow. The shadow of congestion is not sharply outlined, it melts away at its borders.[8]

[8] The paragraphs within the quotation marks are extracted from a paper read December 8, 1916, before The Southwestern Medical and Surgical Association, which appeared in the issue of May, 1917, of Southwestern Medicine.

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"Connective tissue in the parenchyma of the lung away from the hilus is not normally present in sufficient quantity to retard appreciably the passage of the X-rays except as it occurs in connection with and as a part of the various tubes, bronchi, blood vessels and lymphatics. As a result of proliferative inflammation connective tissue develops as a fibrous thickening of these tubes, particularly the bronchi and the lymph vessels, which casts a shadow deeper than normal; the older the process and the better organized the tissue, the denser the shadow and the sharper its outline. Tubercle caseations, as such, cast no shadows distinguishable from the other tissues of the parenchyma. Cohn (*loc. cit.*) found that cubes, 1 cubic cm. in size, of caseous tubercles when embedded in a healthy lung were indistinguishable by the X-ray. But if the caseations become calcified or are even impregnated abundantly with mineral salts they become opaque to the X-ray. . . . In general, and especially if we are dealing with the shadows of tubes, we may say that fuzziness of outline means acute vascular congestion, an active process. On the other hand when the shadows of the tubes are sharp we have a process which if active at all is at least not characterized by great acuity, is not congestive. Stuertz speaks of what he calls *dry* tuberculosis of the lung tissues, which inclines to abundant formation of connective tissue, to dry caseations and cicatrizations or to complete transformation into fibrous tissue, as characterized by sharply outlined granular spots and by more or less sharply marked bands and streaks (18). We would call especial attention to the persistence of the sharply outlined dots and lines when tuberculous activity no longer exists. We cannot emphasize too strongly the point which is so frequently overlooked, that the sharply outlined thickenings of the bronchi and other tubes may be evidence of an old inflammation now entirely obsolete, may be simply records of the ancient history of the pulmonary tuberculosis.

"We do not see tubercles in the X-ray negative. What we see is either sharply outlined calcifications and fibroses, or fuzzy congestions, or a combination of the two conditions. Cohn (*loc. cit.*) states that he has seen cases in which the X-ray in general gave the same findings in both lungs while autopsy proved one lung severely, the other slightly, diseased. Such cases illustrate well the limitations of X-ray diagnosis. What Cohn saw in the X-ray negative was probably the thickened framework of old inflammation in the two lungs, in one accompanied by much parenchymatous disease of recent origin, in the other accompanied by little, the said parenchymatous disease being invisible to the X-ray because neither sufficiently congested nor sufficiently organized to cast shadows.

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"We do not then see tubercle as such any more than we see tubercle bacilli in the X-ray; we see only the results of tuberculous inflammation. It is necessary to insist upon this point because failure to appreciate it has been the cause of much faulty diagnosis."

Frederich Müller (*loc. cit.*) says: "The exaggerated expectations once had for the X-ray illumination have not been fulfilled. It is the experience that fresh and not extensive inflammatory processes, as some bronchopneumonias, or recent tuberculous infiltrations, escape the X-ray negative."

Extensive systems of lines, many sharply outlined spots, dense streaks, do not then show an acute process. Persons in good health with nearly or quite arrested tuberculosis are sometimes found by the X-ray to present a picture of very extensive changes of this kind. Yet the prognosis in such cases is not good if the subjects be subjected to severe strain. The radiograph is a proof that the lungs have undergone serious changes. The danger is either that hardship will lead to a reactivation of the numerous more or less quiescent tuberculous lesions or, if the process has been largely of the nature of fibrosis, that the lungs have been so damaged thereby as to unfit the person for an active life. If then the radiograph shows extensive dappled or mossy shadows or numerous spots and streaks the recruit should be rejected, however, good his health may appear to be. Shadows of a homogeneous opacity result from pleurisy and are not necessarily a cause for rejection in the absence of other signs.

Tuberculosis of the bronchial glands is a diagnosis often made from the radiograph on very slight foundation. The fact is that pronounced swelling of the lymph glands is characteristic of primary, not of advanced tuberculosis. It is rare that intrathoracic gland tuberculosis is of any clinical importance in the adult. Hamburger (19) says: "With few exceptions cases of bronchial gland tuberculosis which lead to true symptoms of disease are confined to the first and second year." Philippi (20) is inclined to exalt the importance of bronchial gland tuberculosis in his elaborate study of that affection, but admits: "It must be remembered that only rarely, especially in adults, is it a purely glandular process; rather is it a more or less pronounced disease of the surrounding hilus-tissue in the form of peribronchial and infiltrative processes of the neighboring pulmonary tissues." In other words the interscapular dullness relied upon for the diagnosis of enlarged glands, if caused by lung conditions, is due to tuberculous processes in the region of the hilus, participation in which to any important extent on the part of the glands is a matter of conjecture. The presence of masses in the neighborhood of the hilus as shown by the X-ray may indeed be cause for

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rejection, but rejection on account of relatively small opacities in that region on the ground that they indicate a bronchial gland tuberculosis of clinical importance certainly should not be permitted.

RÉSUMÉ OF INDICATIONS FROM X-RAY NEGATIVES

The X-ray shows: (1) Tuberculous disease confined to region of hilus in deep lung. (2) Extension upward towards apex or downward and outward towards base, confined to deep lung. (3) A fine line or two extending to apex with or without small focus or foci there. Condition not determinable by physical signs. (4) Clouding of apex without marked lines from hilus, probably largely pleuritic. (5) Well-marked lines extending to superficies of apex, usually, but not necessarily, with foci there. Lesion accessible to physical examination. (6) Lines extending towards shoulder as well as apex. (*a*) If confined to deep lung may mean early and now obsolete exacerbation. (*b*) If extending to superficies denote larger lesion and less immunity than (5). (7) More or less widely diffused spots, lines and streaks through a considerable portion of lower lobe approaching periphery of lung, with few or no auscultatory signs. Deep peribronchial tuberculosis. (8) More extensive streaked opacities involving greater part of one or both lungs and extending to periphery with few or many physical signs. Fibrocaseous tuberculosis, fibrosis preponderating in proportion to scantiness of more or less rounded spots or dots.

Conditions as shown by (1), (2), (3), (4) and (6*a*) are not causes for rejection. Cases under (5) to be determined by physical examination. Cases under (6*b*), (7) and (8) are to be rejected.

DEVELOPMENTAL DEFECTS

The various developmental defects, the paralytic thorax, the scaphoid belly, prominent scapulae, the dropheart, the enteroptotic type, denote arrest in the regular evolution of the body which may be due to tuberculosis in the early years of life. While some "slabsided" men are vigorous and make excellent soldiers, abnormal configurations such as above mentioned, associated with apparent delicacy, constitute a cause for rejection even though no definite disease is discovered. Such types are always well represented at Fort Bayard. Examiners are altogether too careless in accepting such men for enlistment. It is safer to take a chance on a vigorous and athletic man with a well-developed chest though there be signs of an old, not too large pulmonary lesion, than to accept frail creatures who can manifestly never endure great fatigue, though free from signs of actual disease at the time of examination.

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EXAMINATION BY COUGH

This paper is not a treatise on physical diagnosis, but there is one procedure in physical examination which deserves a few words of explanation. Reference has already been made to the method of "expiration and cough." It is best executed as follows: starting from the state of rest of the lung the subject forcibly expels the air from the lungs, reserving the last portion of the expiration for a short cough, after which inspiration immediately follows, but only enough air is inhaled to return the lung to the state of rest. The idea is to diminish the size of the bronchi as much as may be by expiration, then to cough to stir up forcibly such fluid as may be present in them. The moisture is more likely to be moved by the current of air and so produce râles when the tubes are of their least caliber. This procedure should by all means be resorted to by all who attempt to diagnosticate pulmonary tuberculosis. It is also necessary for the successful study of marginal sounds and sternal sounds.

PHYSICAL EXAMINATION

The physical examination for the presence of pulmonary tuberculosis as practiced by the specialist with a view to determine the precise extent, age and probable prognosis of the lesions, including as it should a careful record of past history and of all abnormal signs present, is a time-consuming affair. For military purposes, however, in which the object is to reject from further consideration cases with well-marked positive findings, much can be omitted from the examination and its duration can be correspondingly abbreviated. All that is absolutely necessary is to determine the presence of a tuberculous lesion of sufficient size and activity to constitute a cause for rejection. This can be done in well-marked cases of active tuberculosis in a few minutes, in some cases in half a minute. To demonstrate the absence of disease naturally requires a longer time.

A recommendation having been made several years ago to the effect that experts in lung diseases be stationed at recruiting depots in order to examine the incoming recruits and exclude those affected with tuberculosis before their acceptance, it was objected by higher authority that the examination of each case would necessarily be so prolonged that it would be impracticable to go over the lungs of any considerable number of men within the time that could be allotted for the work.

In order to determine the time requisite for a preliminary examination a test was arranged with the coöperation of Maj. E. H. Bruns, Medical Corps. Annex No. 1 at Fort Bayard is what would ordinarily be called the receiving ward. To it are admitted all incoming patients

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on the status of enlisted men, except those who arrive *in extremis*. The cases that prove to be very advanced or require surgical treatment are transferred to the Enlisted Men's Infirmary. Those who have some fever or who for any other reason are thought to need bed treatment, nursing or special observation are retained at Annex No. 1. The incoming patients who are in the best condition are transferred to Annex No. 2, where they are kept under observation for as long a time as is deemed necessary in the individual cases before being transferred to the wards for ambulant patients. Major Bruns kindly selected 25 of these cases for the test. None of the cases were known to the examiner, but they had been carefully examined, most of them more than once, by his assistants, and the results of the examinations had been recorded upon the case-cards. These cases were examined by the writer by the auscultatory method aided by percussion, auscultation of voice, etc., whenever thought necessary, the object being to determine the least time which was necessary to get an approximation to the correct diagnosis. The time consumed for the whole examination was one and one-half hours. No special effort was made to shorten this time, which was spent to a considerable degree in consulting the case-cards after the examination had been completed in the individual cases, in waiting for patients to remove their clothing, etc. The actual time of physical examination was 58 minutes, the time for each patient varying from 1½ to 2½ minutes. The diagnosis, not only as to the presence or absence of tuberculosis but also as to the extent of the lesions present, was made correctly as determined by comparison with the cards in 22 cases; in two cases the presence of an old pleurisy in which there had been effusion at an earlier time was not recognized, and in one case a cavity was erroneously diagnosticated by carelessness in failing to notice that the patient was breathing noisily. The patients were as a rule afebrile. In most of them there were no signs of present activity; in one there was no evidence of clinical tuberculosis. They were, in short, such cases as might very well have been presented to the examiner of recruits. Of course a diagnosis made with such speed is more or less a "snap" diagnosis, and the method is not recommended for universal adoption except as a preliminary examination to select cases that may appear doubtful for later and more thorough study. Still the results were more accurate than had been expected and show, it is thought, unmistakably that a sufficiently correct diagnosis to exclude cases of manifest and active tuberculosis from the Army can be made very quickly. This may seem to some asking too little of the examiner, but the writer honestly believes, in view of the considerable percentage of cases admitted to Fort Bayard with large and manifestly chronic lesions

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after brief service in the Army, that if all recruits were examined with no more care than was given to the examination above reported the number of patients treated at Fort Bayard would be reduced by at least one-fourth and very probably by a much larger percentage.[4] The importance of these considerations in view of the magnitude of the contemplated army does not need to be emphasized.

RAPID DIAGNOSIS BY AUSCULTATION

The subject, stripped to the waist, is instructed to breathe somewhat more rapidly and deeply than normally, avoiding noisy respiration and relaxing the shoulder muscles as far as possible. The examiner, standing in front of the patient, applies the stethoscope first to the lower axillary region. If breathing is harsh and expiration is prolonged on both sides, the subject is not breathing properly. Regulate the breathing until the breath sounds are normal on one or both sides, and charge the subject to continue to draw each breath with exactly the same force and rhythm throughout the examination. In case abnormal breath sounds are found it is necessary to return frequently to the point over which the breathing has been found normal in order to be sure that the character of the breathing has not been changed by the subject. The patient breathing satisfactorily, we find: (*A*) The breath sounds are alike in both axillae; (*B*) The breath sounds are louder upon one side than the other. Proceeding under (*A*), the examiner goes upward anteriorly, comparing symmetrical points on both sides, noting carefully the character of the inspiration, the character and especially the length of the expiration, comparing the breath sounds frequently if in doubt with the ascertained normal point. If râles are present in the upper axilla, concentrate the attention on the affected side, pass upward rapidly with the stethoscope, have patient breathe out and cough. Râles heard in the axilla will be heard with greater distinctness above. In case of râles disseminated through the upper lobe, reject. If the lung is dry, proceed systematically upward with the auscultation. A lesion of the upper lobe will show either râles or changes in breath sounds (according to its acuity) by the time the third rib is reached in the great majority of cases. Note character of breathing with especial care from this level upward. An old lesion will show harsh breathing and prolonged expiration more marked as one ascends, with or without râles. Continue to auscultate to and above clavicle. If breathing is found to be abnormal, repeat the auscultation while the patient breathes out and coughs. (See "Topical Variations," 1, 2 and 3.) An active lesion (*i. e.*, one with râles) is in general a cause for rejection, but an

[4] See paper by writer in Journal, Association of Military Surgeons, Vol. XIX, 5, November, 1906.

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occasional râle *without changes in breath sounds* is not sufficient cause for rejection. We proceed under (*B*). The breath sounds are distinctly louder upon one side than upon the other.

(*a*) The louder side has normal breath sounds—a pulmonary lesion, pleural adhesions, or both conditions on the other side. Examine the latter side for pulmonary lesions. Have subject cough. Pass round to the back; if râles are present over an extended area, reject. Further corroboration, if necessary—dullness on percussion, increased vocal resonance and fremitus. (Less common in the ambulant subject is dullness with diminished or absent vocal fremitus—(1) pleural effusion; (2) very thick adhesions over parenchymatous lesion. If (1) vocal resonance is absent or very feeble, breath sounds are absent or distant, no râles elicited. If (2) there is dissociation of vocal resonance and fremitus—vocal resonance is present, fremitus absent or diminished, râles generally present after cough, breath sounds absent or distant. Conditions (1) and (2) are causes for rejection.)

(*b*) The louder side has harsh breathing, prolonged expiration—not usual in this location. Concentrate on this side, pass round to back, examine for râles. If rapid search over lower lobe shows no abnormal signs, proceed upward anteriorly as under (*A*). If signs of lower lobe lesion are unmistakable, it is a cause for rejection.

Examination of Back. Secure normal breath sounds right base (see "Topical Variations," No. 8). Proceed upward comparing symmetrical points. If harsh breathing and prolonged expiration heard between scapulae (see "Topical Variations," 9) are abnormal, the signs will increase in distinctness as one proceeds upwards. When these signs are detected test with expiration and cough, if râles are present, reject (but see remarks, p. 629). If breath sounds appear normal go over back when subject exhales and coughs, to eliminate recent disseminations of tubercle. If disseminated râles are present, reject. (For right apex, see "Topical Variations," 1.)

Cavity Signs.—Harsh respiration, much prolonged expiration sometimes distant and low-pitched, with cavity quality. Cough usually produces characteristic râles. Vocal resonance and whisper characteristically increased. A cavity unmistakably present is cause for rejection.

TOPICAL VARIATIONS OF NORMAL SIGNS

1. Harsh breathing, slightly prolonged expiration over right apex posteriorly, without other signs, is not cause for rejection (proximity of bronchus). The same signs anteriorly over the right apex if slight are not necessarily pathological.

2. The same signs second interspace right anteriorly close to sternum

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are not a cause for rejection (proximity of right main bronchus). If these signs are found outward and downward from this point they indicate a lesion.

3. Increased vocal resonance and slightly harsh breathing immediately below center of left clavicle are occasionally found. They do not indicate a lesion in the absence of other signs.

4. Fine crepitations over sternum or heard when stethoscope touches edge of that bone are not pathological.

5. Clicks heard during strong breathing or after cough in the vicinity of the costo-sternal articulations (below the first) in the absence of other signs are not indicative of a lesion.

6. Sounds resembling râles at base of lung, especially in right axilla, are not pathological if strictly limited to the base and to inspiration and not accompanied by other signs.

7. The same is true of sounds resembling râles over the lingula (heart apex) heard on cough.

8. Prolonged expiration at left base posteriorly, limited to this region, is not abnormal.

9. Slightly prolonged expiration at about the angle of the scapula, *disappearing a short distance above this point*, is not a sign of a lesion, if alike on both sides (transmission from normal bronchi) and not accompanied by other signs.

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THE SANITARY SERVICE OF THE AUSTRO-HUNGARIAN ARMY IN CAMPAIGN

By Major JOSEPH H. FORD

Medical Corps, United States Army; Military Observer

(With twenty illustrations)

THE DIVISIONAL MEDICAL SERVICE

SO far as my observations extended, field hospitals were not assigned to divisions nor was this contemplated in regulations. They remained under the immediate jurisdiction of the chief surgeons of the several armies.

Four types of these divisional medical units were recognized in regulations. (1) with an infantry division; (2) with a cavalry division; (3) with an infantry brigade; (4) with an infantry brigade equipped for mountain warfare.

That of the infantry divisional medical unit was as follows:

Personnel: Six surgeons, mounted; two commissioned officers and about 125 non-commissioned officers and men of the Army Medical Corps, including two artificers and six cooks. The unit was under the command of the senior medical officer. All quartermaster, commissary, and clerical duties were performed by the officers of the Army Medical Corps. They were not medical officers.

Train: Seventy-seven men, 145 horses, 38 vehicles. Two more vehicles were added to most units as the war progressed, viz.: a two-wheeled disinfecting plant and a four-wheeled water purifier. Also as occasion required wagons were hired locally to assist in removal of wounded. The unit consisted of the following elements: (1) An echelon of nine two-horse steel wagons. They weighed, empty, 520 kg. and carried a load of about 300 kg. (2) The slightly wounded station. Its equipment was carried on two four-horse wagons, which could be used for the transportation of supplies, or for the transport of four recumbent and three sitting, or seven sitting patients. This section did not operate separately, but was attached to the dressing station, the slightly wounded station as a separate organization having been found impracticable. (3) The dressing station section consisting of: Four four-horse medical stores wagons, similar to those used in the slightly wounded station. One four-horse covered wagon furnished by the Teutonic Order of Knighthood. Four two-horse open wagons. One two-horse field kitchen. (4) The echelon of ambulances consisted of eleven four-horse ambulances, and four four-horse ambulances furnished by the Teutonic Order of Knighthood. These vehicles carried

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four recumbent and three sitting patients, or ten sitting patients. (5) Two four-horse medical stores wagons for reserve supplies. (6) Many units had additional wagons, hired locally to remove wounded or collect supplies.

The first-aid station wagons were driven forward as required (usually at night), to the first-aid stations to replenish the supplies expended by the medical equipment bearers, and to furnish additional supplies for current use; *e. g.*, cooking utensils when such a station was established. The surgeon in charge of the station receipted for the articles he abstracted in an "inventory book" attached to the inner surface of the door of the wagon. No other transactions concerning transfer of these supplies were required.

After the lightly wounded and dressing station sections were consolidated, the dressing station consisted in effect of the entire personnel of the unit, other than the drivers of the first-aid station wagons. The station was operated in three general groups; one for the reception of patients, another for surgical work, and a third for the temporary care of the wounded awaiting their removal, or their more permanent care if they proved untransportable. The dressing station was divisible into two separate sections which might operate at a distance from each other, but this rarely occurred in practice. These sections had the same equipment and received cases of all degrees of severity.

FIELD HOSPITALS

Field hospitals were established in the proportion of three to a division. Each accommodated 200 patients, but was expansible to 300. The personnel consisted of three surgeons, 1 chaplain, 1 quartermaster, 1 pharmaceutical official, with 1 officer and about 60 men of the Army Medical Corps. The senior surgeon commanded the unit. The train consisted of 23 vehicles and about 40 men, of the train troops including a civilian wagon master and in some units civilian drivers. The vehicles in detail were the following:

Eight four-horse wagons for medical stores (2 with surgical supplies, 1 with cooking utensils, 1 with hospital supplies, 3 with bedding, 1 with reserve supplies). One two-horse open wagon carrying drugs. One four-horse covered wagon carrying food supplies. One two-horse rolling kitchen. One two-horse omnibus, for the use of dismounted officers. Five two-horse supply wagons, carrying food for six days for the personnel on duty with the unit and its train. Five two-horse ambulances, furnished by the Red Cross.

Ordinarily these ambulances were supposed to transport the wounded from the dressing station to the hospital and thence to the evacuation

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point. This division of the ambulances between the dressing station and the hospitals and the assignment of a certain number of these vehicles to each of these units proved a very valuable method of distribution; much better indeed than their collective assignment to either the dressing station or the hospital alone. Many hospitals were also provided with from five to twenty other wagons, hired locally as required and used to transport wounded or collect supplies.

Certain hospitals not provided for specially in regulations before the war, but which proved to be of great value, were those organized by eminent civilian surgeons, who were given military rank. Hospitals of this kind organized by Professor Rotkowski, Albrecht, Eiselberg, and Lummitzer were inspected. A number of others were said to be in service. The surgeon at the head of each of these units selected his own personnel and was given an equipment similar to that of the field hospital, but more elaborate, especially in its operating room equipment. As the war progressed the value of these units became so pronounced that both the personnel and the equipment of many of them were increased. Thus, on August, 1915, the unit under Professor Rotkowski consisted of 8 doctors (6 of them medical officers), 15 nurses, 41 hospital corps men, with 1 non-commissioned officer acting as clerk. Its transportation then consisted of 3 passenger automobiles, 2 auto trucks, 3 auto ambulances, 1 rolling kitchen, 1 water sterilizer, 35 wagons, and 4 saddle horses. This quota of transportation was said to be larger than that of other units of this character, and was much larger than that of the average field hospital.

These hospitals operated, as a rule, as near as possible to the front and were designated for the reception of severely wounded cases only. Their essential purpose was to give such cases the best surgical care available as promptly as possible.

I was informed that about 50 other mobile surgical units were organized, each consisting of 3 surgeons, 4 nurses and 10 hospital corps men. They were supplied with 2 wagons each, and were ordered to the points of greatest activity, to supplement dressing station or field hospital service. The nurses were soon withdrawn from these units, since they could not endure the hardships. Because of their relative scarcity of supplies and their operating so far afield, these units eventually did little else than ordinary dressing station work. For that purpose they were said to have proven valuable in meeting local temporary requirements at different parts of the front.

Automobile ambulances were employed in increasing numbers as the war progressed, but no fixed quota was assigned to armies or corps. Only on one occasion, *i. e.*, at the Rotkowski hospital, did I find them

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permanently attached to a field or other hospital at the front, but they were in constant service of hospitals on the line of communication and at the base.

MOBILE UNITS ON THE LINE OF COMMUNICATION

Mobile Reserve Hospitals

The mobile reserve hospitals had the same general organization and equipment as the field hospitals, except that they had no reserve supplies, and in theory no train troops or transportation. When they moved they employed local vehicles. Eventually it was found necessary to furnish each of them with an echelon of five or six ambulances. One open wagon was also constantly available for transporting the apothecary supplies, and three peasant wagons were used to carry the food supplies of the personnel on duty with the unit. Six of these hospitals were provided for each corps, *i. e.*, three to a division. Three of them accompanied the troops into the area of deployment while the others were held in reserve, in the corps depot.

Field depots for slightly sick or wounded were provided in the proportion of three to a corps. One of these accompanied the corps into the area of deployment; the supplies of the other two being kept until called for in the corps depot, which is discussed below. Each of these depots for slightly wounded or sick accommodated 500 patients. The personnel consisted of two medical officers, one officer and thirty men of the Army Medical Corps.

The supplies were carried on fourteen peasant wagons or seven Government vehicles. The equipment was somewhat similar to that of a dressing station, but with ampler supply of bedding, *e. g.*, 1,000 sheets, 1,000 counter-panes, 500 bed-sacks, 500 pillow cases, etc.

Rest stations were established as required on the line of communication. Several types of these are recognized.

(1) Stationary rest stations, located at points and in buildings selected for this purpose in time of peace throughout the monarchy. They were provided with means for subsisting patients and for providing them with a night's rest. Stationary refreshment stations, where tea, coffee, bread, and soup were obtainable, were furnished in all the larger railway stations. (2) Mobile rest stations in the proportion of two to an army corps were provided; these, in some cases, were furnished with means for a night's rest for patients, but in other cases they were not. They were usually located on a railway line. (3) Provisional rest stations which afforded accommodations for a night's rest if situated on a road but without this if situated in or near a railway station.

Evacuation stations were established at those points near the front

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when wounded were collected and through which they passed. They corresponded more nearly than any other unit in the Austrian service to our evacuation hospital but had no fixed organization, varying greatly as circumstances indicated in the quota of personnel and equipment. The personnel was detailed from the reserve bodies of the medical department, increased if necessary by civilian attendants. At larger points near the front, these stations operated in conjunction with other mobile units established locally, *e. g.*, two or three mobile reserve hospitals, a field depot for slightly sick, a mobile rest station, etc. For example, the rest station at Krakau located in the railway yards and accommodating 40 recumbent and 550 sitting patients, received patients coming in from the front and distributed there among the numerous hospitals established in that city. It also received patients from these hospitals, who were being sent further to the rear, gave them temporary accommodation and refreshment, and loaded them into the proper trains. Like other evacuation stations it was equipped with a kitchen, a disinfecting plant, an operating room, etc., and was in fact a small hospital. The personnel of this unit in February, 1915, was 3 medical officers, 20 nurses and 65 men of the Army Medical Corps, and that of such a station in Kolomen in July, 1915, was 1 medical officer and 10 men. A month later it had 3 doctors, 4 nurses and 32 men. This elasticity in the organization of these units was undoubtedly a desirable attribute. They discharged their functions admirably.

Mobile dental clinics were provided in the proportion of one to an army, and as a rule were located at the head of the respective lines of communication. One such unit with the seventh army had a personnel of two dental surgeons and four hospital corps men who had technical ability. The surgical equipment filled two chests about 2½ by 1½ by 1½ feet, and two cupboards. These cupboards were so constructed and packed, that when the doors were locked they were used as packing boxes for their contents when this unit moved. The equipment included chairs, tables, etc., and filled two native wagons. It was bulky rather than heavy and offered nothing of especial interest.

The surgeons on duty with these units were supposed to perform the surgical operations indicated after gunshot wounds of the jaw. In point of fact such operations were rarely performed since the face was greatly swollen when the patient reached hospital, at the points where these dental stations were located, and it was not until some weeks later, after the patients had been sent to the rear, that such operations were feasible. A very important unit assigned to the line of communication of each army was a sanitary commission. It nor-

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mally consisted of three army officers who were skilled bacteriologists and hygienists, and a pharmacist who was a capable chemist, assisted as required by eminent civil specialists. Its other normal personnel was one non-commissioned officer and four men of the hospital corps, who were trained laboratory assistants.

These units did very valuable work. Four of them were inspected in the service of different armies. They were assisted in their local activities in corps and divisions by surgeons there on duty.

In addition to the sanitary commissions on the staff of the line of communication other laboratories, mobile and otherwise, were established at various points. Twenty-one mobile laboratories were said to be in the service of the entire army, in August, 1915. Their equipment differed in some respects, but in general was that itemized in the section of this report on mobile laboratories.

The "Ambulant" field hospital medical institutions comprised hospital and ambulance trains and hospital and ambulance ships. The first mentioned units are discussed in a separate section of this report and the equipment of three ambulance trains was provided for each corps. Hospital trains were provided as needed.

Hospital ships were supposed to be furnished in the proportion of one to a corps for such corps as required their services. They were seen on the Danube and Save rivers, but not in such numbers as had been anticipated. It was explained that the quicker transport by rail into the interior of the monarchy had restricted their value and that they were used habitually over comparatively short routes, and not over long reaches of the river as had been contemplated. Usually they plied from points on the Servian shore to the nearest railroad on the Austrian side of the river. Some of these ships were passenger steamers converted to that purpose carrying from sixty to 120 recumbent or 130 to 250 sitting patients, and others were large grain barges towed by tugs and accommodating from 50 to 80 recumbent or from 100 to 150 sitting patients.

In the barges beds were made of well-filled straw sacks placed directly on the floor of the vessel. It had been contemplated that all barges would be used for both sitting and recumbent patients, but so far as my observations and information extended these classes of patients were transported in separate vessels. Also it had been anticipated that the number of beds provided would be made to vary according to the prospective length of the journey, but in practice restrictions of this character were removed and patients who might require bed accommodation were provided with it, if possible, irrespective of the period of their stay on board. The personnel and equipment of a hospital ship were

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proportionately similar to those of a hospital train (*q. v.*). The temporary ships had a personnel of one non-commissioned officer for each barge or small steamer thus used, and twelve men for each 100 recumbent patients or four men for each 100 sitting patients.

One mobile field depot of medical supplies was provided for each corps, and one Red Cross depot for each army.

The personnel of this depot consisted of a first lieutenant, three non-commissioned officers, and eight men. Its equipment was said to weigh about 100 tons, but it is believed that at the time it was inspected it did not weigh more than 30 tons. When it moved it was furnished eight or nine freight trucks by the automobile service. This unit with the others drew its supplies from a larger mobile depot of reserve supplies about 40 miles to the rear, the material being forwarded by rail or auto trucks. Most of the material was kept packed often, I was told, in railway cars on convenient sidings, and only such was opened as might be needed from day to day. The boxes containing supplies were marked on at least three sides with their contents. Many such boxes measured 5 feet by 4 feet by 4 feet, this appearing to be a convenient size, in reference to the demands upon their contents.

The Red Cross supply depot with the Seventh Army carried surgical dressings, bedding (especially bed sacks), pillows and blankets, ward utensils, comestibles and stimulants. Its chief issues were said to be dressing materials and comestibles. I was unable to learn either its personnel or its quantities of contents or issues. It made issues usually to the divisional medical units or to the depots for slightly sick.

For each army there was in the line of communication a depot of reserve supplies which included those corps units described below. For each corps there was provided a depot of reserve supplies called the corps unit. In this depot the corps left the equipment of those units which it did not take with it into the field on mobilization, but requisitioned later as required. When it took the field the corps took with it the following units pertaining to its line of communication: Three mobile reserve hospitals; 1 depot for slightly sick or wounded; 1 ambulance train equipment.

It left in the depot until called for the following: Three mobile reserve hospitals; 2 depots for slightly sick; 2 ambulance trains equipment; 2 mobile rest stations; 1 depot of reserve supplies, common to all these units.

I was frequently informed that some of these reserve units yet remained in storage. The hospital facilities provided at the front appeared to be adequate, as a rule, in the several armies visited, except for a few hours after heavy engagements, when overcrowding occurred in

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Przemysl and Belgrade, but this was apparently due to interrupted evacuation. In Przemysl I was informed in October, 1914, that eight field or reserve or garrison hospitals, three Red Cross hospitals and six stations for slightly wounded were caring for from 15,000 to 18,000 patients. Some 1,200 wounded in Belgrade were turned over to the American Red Cross hospital there when the Austrian troops withdrew in December, 1914.

The reserve body of medical personnel attached to the headquarters of the line of communication of an army was a very important element. This personnel was employed to compensate losses at the front, to man additional mobile reserve hospitals called into service, depots for slightly sick, or ambulance trains that might be put in commission, rest stations, provisional medical units, etc. The quotas of these per corps were: 30 medical officers; 2 chaplains; 2 quartermasters; 6 pharmacists; 5 reserve medical detachments of 125 enlisted men each.

Of this personnel Detachment No. 1 formed the reserve for duty with troops. Detachment No. 2, 3, 4, manned the reserve hospitals already placed in commission when the troops were mobilized. One-half of Detachment No. 5 manned the field depots for slightly sick, while the other half of this detachment manned the ambulance train provided for the corps and rest stations.

In addition to the foregoing a supplementary detachment was provided for a divisional or brigade medical unit equipped for mountain warfare operating independently The divisional unit thus supplemented could form four mountain dressing stations, while a mountain brigade medical unit could form two such units.

A detachment thus organized consisted of 1 surgeon, a variable number of men of the hospital corps (usually 15), 8 pack animals carrying medical supplies, and 9 pack animals carrying provisions.

Concerning equipment, as here discussed, only those items are mentioned which are believed to be of especial interest.

Ambulance dogs were used by the Austrian Army when troops were advancing or retreating, but not as a rule, during trench warfare, unless there was a local armistice for the recovering of wounded. They were said to give excellent results, but I did not see any of them at work. As a rule, they were allowed to run free, either returning with some parts of the wounded man's equipment or remaining by him and barking. The former method was said to be the better, especially in rain, fog, snow, or in thick underbrush. Partially trained dogs worked on a leash. A dog carried no equipment except a collar bearing his name, and the official designation of the unit to which he was attached. Some dogs at one time were not provided with collars, but several of them were

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believed to have been lost because of that fact. It had been believed that a collarless animal would prove more difficult for the enemy or civilians to capture and the use of collars had been discontinued for that reason. All ambulance dogs seen were of the police dog breed, but other breeds were said to be in service.

The normal tentage for a field hospital was said to be 20 tents, but varied greatly in amount. Many units, it appeared, were quite unprovided with it. The tents used were circular of the tortoise type, *i. e.*, the roof was supported by an upright, resting on a stringer which in turn rested on supports, about 6 feet high at the front and rear of the tent. The walls were supported by twelve stakes 6 feet high. The structure was 25 feet in diameter and 12 feet high at the apex and accommodated about 25 men.

As mentioned elsewhere field and reserve hospitals usually occupied local buildings and rarely pitched tentage. Only one hospital under tentage was seen in a year's service and the commanding officer of the corps to which this unit belonged informed me that this was the only occasion upon which any of his tentage had been pitched. Dressing stations were said to be provided with one tent each, but so far as my observation extended they always occupied a building.

Rations for about six days for their personnel were carried by field and reserve hospitals and divisional medical units. Later this was increased in some units to provision for ten days, and, in addition, when a unit changed station by several head of beef cattle. This practice of carrying several days' supplies was said to have proven highly advantageous, rendering the unit independent of the commissary service for brief periods at times when that service was engaged in moving its supplies and least prepared to make issues. An especial reason for their carrying commissary supplies was the fact that the hospitals usually served at some distance from the troops and the replenishment of their supplies from corps depots was therefore sometimes delayed.

Light wine formed a part of the soldiers' rations and was furnished in large quantities to field and reserve hospitals.

Hampers were extensively used for the reception of the equipment carried on pack animals in mountain warfare, and for packing the equipment carried in many of the wagons. They were strong, light, and serviceable—well adapted to the purpose for which they were used.

Apothecary supplies for units other than those engaged in mountain warfare, were packed in chests in superimposed trays, subdivided into cubicles which were lined with felt. Containers were cubical and usually of glass. Eventually they were also surrounded in some outfits by corrugated cardboard, an expedient learned from captured Russian

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material. The chests were of different shapes and sizes, but had an average capacity of about 9 cubic feet.

In dressing stations and temporarily in some field and reserve hospitals patients were placed on piles of straw, which were arranged around the walls of the rooms, and in some cases held in place by footboards about 6 inches high. This practice was also followed in some wards of the reception hospitals at Maramois Siget, 150 miles behind the front. Field and reserve hospitals did not carry bedsteads or cots, but bed sacks and pillow sacks. As soon as opportunity permitted these were filled with straw and either placed on the floor of the buildings occupied or on bedsteads which were collected locally or sent up from the depot on the line of communication. Very few bedsteads were carried in the field depots.

Extemporized operating tables and tables for instruments were often made in the mission style, with saw horse legs, with three wooden rods passing from end to end, joining to each other the lower ends of the legs, on corresponding sides, and the points where uprights crossed. The top of the table was made of several boards. It was prevented from slipping by a rim around its lower surface which engaged the upper ends of the crossed uprights. The entire apparatus was demountable.

Field and mobile reserve hospitals were not equipped with Roentgen apparatus. The only field unit found which was thus provided, and which, I was told in many quarters, was in this respect unique, was the surgical unit under Professor Rotkowski. The machine in this hospital consisted essentially of a six-horse power, two cylinder marine gas engine, connected by a belt with a generator developing 2-kw. alternating current when making 1,600 revolutions. The apparatus had an electrolytic interrupter using chromic acid and was capable of developing a 10-inch spark. The current was stepped up by a transformer to 80,000 volts.

The tubes were carried mounted in felt lined supports in a heavily padded box, the tubes being fastened in the padded jaws of wooden vises and supported by cotton batting or excelsior. The machine proved of very great value, though its photographs were not especially good.

Military hospitals near the front used the premises of existing civil hospitals and employed the X-ray plants with which they were equipped.

The litters employed were of four types (1) for use in certain hospital trains (*q. v.*), (2) for general purposes, (3) for removal of patients in mountain warfare; (4) for transportation in wagons.

The litter used for general purposes is much lighter than ours, has rigid cross pieces, litter slings separable from the litter and is demount-

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able. The litters were carried into the field disassembled, as a rule. Each litter consisted of (*a*) two poles; (*b*) two cross pieces with an iron eye 1¼ inches by 2 inches at each end; (*c*) canvas bed with a long loop extending along each side of the edge of the bed and through which the poles could be introduced; (*d*) wooden uprights, each fastened to the cross bars by a bolt, and which could be made to fold up parallel to the cross bar when the litter was folded, or which were held erect to serve as stirrups, and foot braces when the litter was assembled. The canvas was fastened by straps to the head and foot cross pieces and had stitched loops or hems along its sides for about four-fifths its length. The other fifth was raised, forming a pillow-like inclined plane and was supported by being fastened to the upper ends of the corresponding uprights. The poles were run through the iron eyes at the ends of the cross pieces and through the loops along the sides of the litter bed. The litter was dissembled by withdrawing the poles, folding the uprights parallel to the cross braces and rolling these up in the canvas to which they are attached.

The third type of litter mentioned above was, in fact, a chair with side bars and handles about 42 inches long, the seat and back being made of canvas. None of these were inspected by the writer. Because of the short length of the side bars they were said to be especially serviceable in the trenches.

The fourth type of litter was not much used. It was made of a canvas bed with springs fastened to each corner, and to each of these a rope, which was made to engage some point of support in a wagon frame, so that the litter could be suspended about 6 inches above its floor. It was used only for the transportation of patients, in wagons, over very rough roads.

The sixteenth artillery division used as litters doubled blankets with loops sewed to the corners. These were carried on the caisson and were said to be more satisfactory than the litter commonly provided since they were always on hand when needed, and the others carried on the utensil wagon of the batteries were normally several kilometers in the rear. The poles of the common litter made it inconvenient for carriage with both cavalry and artillery. These branches of the service, other than the organization mentioned above, carried their litters in light wagons at the head of their wagon trains, until an action occurred, when they were brought forward, and the wagons used for removal of wounded.

Litters were supplied in such abundance (more than the quantity called for by regulations), that extemporized litters were not often seen except after severe engagements.

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Diagnosis tags were made of heavy oiled paper. They measured about 4 inches by 2½ inches and had a metal eyelet through which a stout loop of black thread was passed, whereby they were fastened to a button on the patient's clothing. They were furnished in two colors—red for slightly wounded cases, and white for severely wounded.

The first-aid dressing carried by all officers and enlisted men measured 2½ inches by 2½ inches ¾ inch. It contained two compresses, each formed of a layer of 5 gm. of absorbent cotton between 5 layers of gauze, and a gauze bandage, 2½ inches wide and 4½ yards long and a safety pin. One of the compresses was free, the other was sewn to the bandage. The packet was covered with cellulose paper sealed with colloidin like those mentioned above, then with a water-proof cloth, and then tied with tape, fastened by a lead seal. Many of the dressings used at first in the field and reserve hospitals had been sterilized, compressed and wrapped at the base, but eventually this frequently was not the case.

At first raw cotton was used for packing splints, later it was replaced to a degree by a fine grade of excelsior and yet later by thick tissue paper, apparently made from wood pulp. This last was used in layers of ten to twenty sheets under splints over dressings already applied.

It was noticeable that no attempt was made to rely upon extemporized splints. The most popular types of splints were the following: (*a*) The starch bandage. This was stiffened in some cases by the interposition of strips of wood about ⅛ inch thick, 1 inch wide, and of convenient length, cut as required from larger sheets of match board, carried with other surgical supplies. This dressing was used especially in large wounds of soft parts and in wounds of the cranium. In cases of fracture stouter splints were used. A drawback to the value of the starch bandage was the fact that it retained the exudate from the wound. (*b*) Wire net. This was furnished in strips about 20 feet long and 3 feet wide. It was similar to that carried in our hospital corps pouches but of much lighter texture. (*c*) Wire splints. Each of these was made with a contour frame of heavy zinc wire. There were many convenient dimensions. Across these frames smaller wires were led in a criss-cross figure and secured to the rim by another encircling wire or by drops of solder, or light transverse wires were used. These were the best splints provided for field service. They were light, convenient, adaptable, and allowed free drainage of discharges from the wound. A special type of this was used for fractures of the thigh. It was provided with four flanges which practically encircled, respectively, the thigh and the trunk. (*d*) Felt splints were used to a limited extent. (*e*) Tin trough splints for fractures of the leg or thigh were furnished in large

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HOSPITAL CORPS EQUIPMENT.

LATER HOSPITAL CORPS EQUIPMENT.

HOSPITAL CORPS EQUIPMENT, REAR VIEW.

(To face page 656.)

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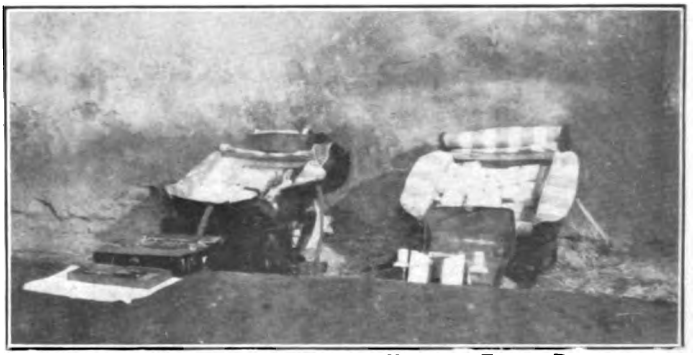

MEDICAL AND SURGICAL KNAPSACKS FOR USE WITH TROOPS DISMOUNTED. INSTRUMENT CASE FROM SURGICAL KNAPSACK AT LEFT.

MEDICAL AND SURGICAL SADDLE BAGS WITH CONTAINED ALUMINUM CASES AND CONTENTS FOR USE WITH MOUNTED TROOPS.

LITTER WITH HOOD, CORNER ROPES WITH SPRINGS TO BE SUSPENDED TO UPRIGHTS AT CORNERS OF WAGON.

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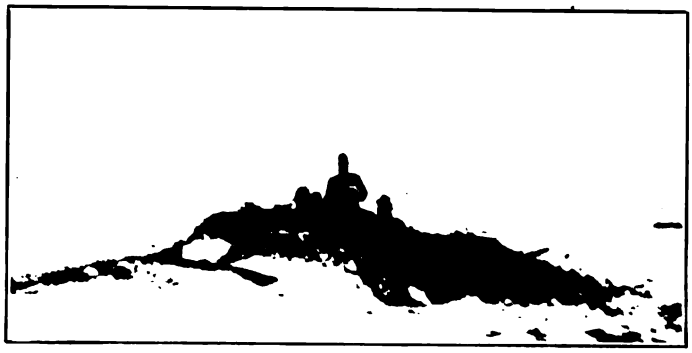
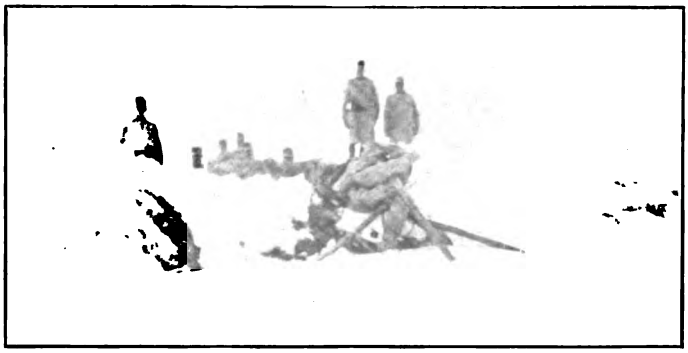


First-Aid Station



First-Aid Station

First-Aid Station

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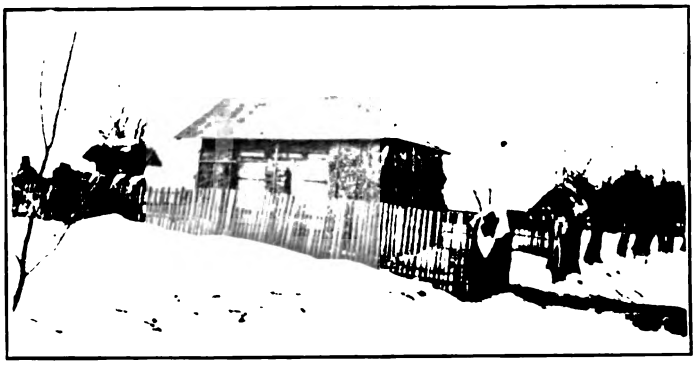

First-Aid Station

First-Aid Station

First-Aid Station.

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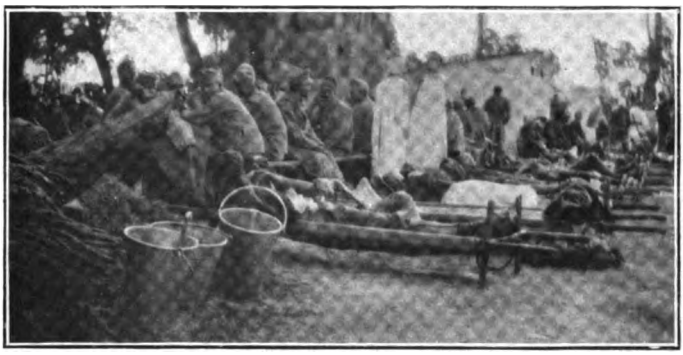
FIELD HOSPITAL OCCUPYING SCHOOL BUILDING AT THE FRONT.



EVACUATION STATION. PATIENTS PREPARED TO BE PLACED ON TRAIN.

AMBULANT WOUNDED GOING FROM FIELD HOSPITAL, KOLOMEA, TO NEIGHBORING RAILWAY STATION.

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AMBULANT WOUNDED GOING FROM HOSPITAL TO NEIGHBORING RAILWAY STATION.

FIELD MEDICAL SUPPLY DEPOT OCCUPYING BUILDING AT KOLOMEA.

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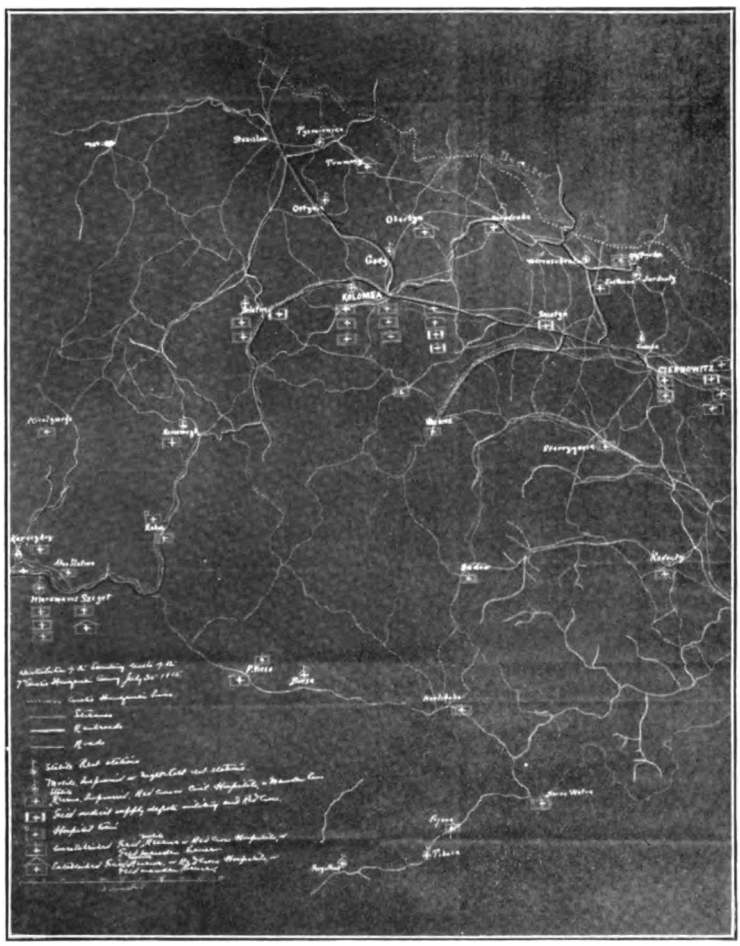

MAP SHOWING DISTRIBUTION OF SANITARY UNITS IN THE SEVENTH ARMY IN GALICIA AND BUKOWINA AND ON ITS LINE OF COMMUNICATION.

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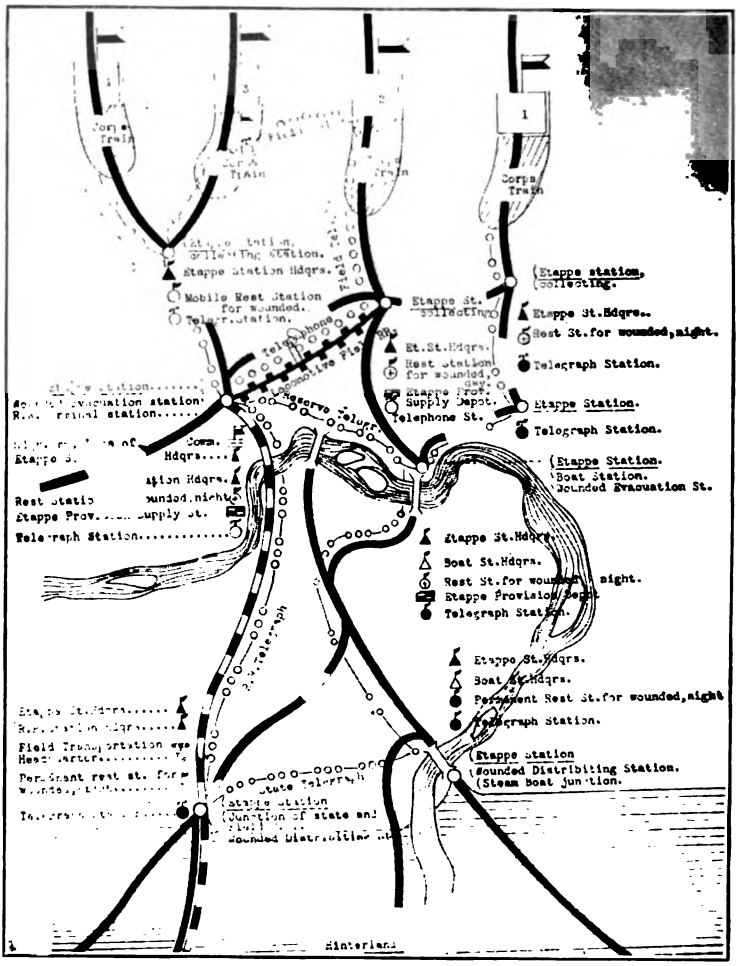

SCHEMATIC DIAGRAM OF ORGANIZATION OF LINE OF COMMUNICATION.

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numbers, but were eventually replaced to a large degree by wire splints. (*f*) Wooden splints of various sizes were carried by all the sanitary units and by the medical equipment bearers. In one type carried with troops and in the dressing stations and ambulance columns each splint was about 16 inches long and 4 inches wide and provided at one end with a tin socket, into which fitted the corresponding end of the adjacent splint. Splints elongated by this device were used for fractures of the thigh. A type used in field hospitals where supplies had been depleted, was a strip of wood 4½ feet long, 3½ inches wide and half an inch thick, notched deeply at both ends. A bandage encircling the ankle engaged the notch at the lower end of this splint (which was applied to the outer surface of the leg and thigh and projected below the foot), while another bandage, passing through the crotch, engaged the notch at the upper end of the splint. Traction on the bandages passing through these notches made extension. The splint was considered primitive, but was very effective. (*g*) Plaster of Paris was used in the field and reserve hospitals, seldom further afield.

The quantities of supplies distributed from the field depots could not be learned. The only reliable data covering the quantities of supplies most used are those given below.

Data from Rotkowski Hospital, obtained August 29, 1915.

The following monthly average for the preceding five months:

Beds, 240; beds occupied, 225; admissions, 490; operations, 253; dressings, 2,322; plaster casts, 85; Roentgen photos, 84.

The following were the average monthly quantities of the most important supplies expended:

Absorbent cotton, 350 kilos; cotton in rolls, 400 rolls at 250 gm. per roll; starch bandages, 2,800; absorbent organtin bandages, 2,166 meters of material, *i. e.*, 1,300 bandages, 10 m. long and 10 cm. broad; crude organtin in rolls, 1,433 meters; absorbent organtin in rolls, 2,800 meters; muslin bandages, 400 meters; muslin in rolls, 985 meters; excelsior, 100 bolts; gasoline, 8 kilos; tr. Iodi, 6 kilos; plaster of Paris, 130 kilos; soap, 35 kilos; tubing, 9½ meters.

The following were said to be the most important issues made in Reserve Hospital No. 1, Kolomea, Seventh Army. This hospital had an average of 220 beds and received about 400 patients monthly.

The figures are the monthly average of three months.

Phenol, 48 kilos; lysol, 30 kilos; acidsalicylic, 720 gm.; ether, 4 kilos; aluminum acetate, 48½ kilos; benzine, 29⅓ kilos; hydrogen peroxide, 17 1/6 kilos; hydrarg bichlor. corros, ⅔ kilos; tr. iodi, 6 kilos; absorbent cotton, 95 kilos; wood fibers, excelsior or tissue paper, 93 kilos; organtin (meters), 3,760; muslin (meters), 1,133.

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The American Red Cross Hospital in Vienna with 320 beds, five doctors and fifteen nurses, expended for each 100 beds per year the following: non-absorbent cotton, 650 lbs.; absorbent cotton, 600 lbs.; gauze, 1,400 yds.; roller bandages, 800 lbs.; crinoline, 250 yds.; plaster of Paris, 70 lbs.; adhesive plaster, 12-inch rolls, 30 rolls; rubber gloves, 25 pairs; catgut ligatures in tubes, 40 tubes; chloroform, 15 lbs.; ether, 35 lbs.; tr. iodi, 8¼ lbs.[1]

Kalikok, similar to calico but not exactly identical, was a popular bandage material. It was intermediate in texture between cheese cloth and unbleached muslin. It was received in bolts which were washed, boiled, dried and ironed before it was made up into bandages.

Gutta percha strips folded longitudinally were used by Dr. Bavani (a recent recipient of the Nobel prize), in Przemysl for the drainage of abscesses of the brain. This material, he stated, gave better results than any other, provided it was not inadvertently folded transversely when being introduced into the abscess cavity.

Tetanus antitoxin was issued in large quantities to all field units, and to the sanitary personnel on duty with troops.

Mastisol was used in some hospitals for dressing small wounds. It operated in the same manner as colloidin but was much more adhesive. It was made of equal parts of grain alcohol, and mastich, which latter agent was manufactured by Gebruder, Schubert, Chemische, Fabrik, Berlin, NW. 5. In some hospitals it was highly praised.

Suprarenin hydrochlorid syntheticum (said to be made by Mesiter Lucius and Brunnig, Hoechst, on the Rhine, Germany), was used in one hospital as a substitute for adrenalin, since it cost one-third as much.

"Wasserstoff—hyperoxyd in fester-form," was much used in large suppurating wounds. The medicament came in tabule form, each tablet weighing about 2 gm. It developed H_2O_2 as it dissolved in the wound.

The following ointments were those most used: For miscellaneous purposes, zinc-oxide or ac. boracic 10 per cent; sulphur flor., 10 per cent; naphthalin, 10 per cent, or one containing anise oil, 3 per cent; sulphur flores, 20 per cent; all in vaseline. For granulating painful wounds the following was much employed: Argentii nitras, 9; balsam Peru, 90; vaseline ad 900. Zeroform, *i. e.*, Bismuth Tribromo Phenylicum, was used in some hospitals in non-suppurating wounds. Ethylchlorid was the agent most used for local anesthesia. Gasoline was used in the dressing stations and field hospitals for cleaning fresh wounds and their vicinity and followed by tr. iodi. Tr. iodi was supplied in large amounts to all units and detachments.

[1] Figures kindly furnished September 20, 1915, by Dr. Cary A. Snoddy, commanding the hospital.

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Rubber gloves were used at first in the reserve hospitals and in some field hospitals. Later they were not generally obtainable and white cotton gloves were used instead.

Disinfectants most used in the epidemic hospitals were lysoform, liquor formaldehydi saponificatus, hyperol, and phenol. The proportionate amount of these varied greatly in different units.

Torches were supplied for the first-aid station wagons and also for general use among the troops in Servia. They were about 5 feet long, and made of three strands of rope each ¾ inch in diameter, which apparently had been dipped in tar or tar and resin, and had been twisted together before they were allowed to dry. They gave a strong light—the flame being about 1 foot high and burned about four hours.

Electric torches were not provided by the Government but were carried by all officers. Almost invariably they were about 5 inches long, 4 inches wide and ¾ inch thick. A number of patterns were in use. The most popular types had either a small lens at one end, or a large lens on one side. This latter torch was provided also with a loop on the back whereby it could be fastened to the belt, and at the top had a buttonholed flap by which it could be fastened to one of the upper buttons of the coat or overcoat.

Cylindrical tin boxes about 4 inches long by 1 inch in diameter, with screw tops were furnished field hospital, dressing station and first-aid station wagons for transmission of laboratory specimens. To the inner surface of the lid was fastened a tin spoon by means of which a specimen of faeces or sputum was obtained. The lid was sealed by paraffin and the closed box placed in a wooden container in which it was transmitted, either by special messenger or through the mail, to the nearest laboratory.

The organization and equipment of the sanitary detachments on duty with troops, and of field units was said to be generally satisfactory with the following exceptions:

1. The quota of medical officers was quite inadequate, but could not be increased because of the demands on the medical corps for such officers in hospitals further back. Also, especially after cholera appeared in the monarchy, a number of physicians who would have been called to the colors, were retained in their homes to treat local civilians and to perform board of health functions. I was told in several corps that as the war progressed, there was a scarcity of medical officers with troops and this resulted in their being habitually kept in the rear of the first-aid stations—also that the number of these stations diminished. Information on this point was somewhat contradictory, but the general conclusion reached was that the quota of medical officers with

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troops had proven inadequate to meet the needs in an engagement and that losses among them were not easily replaced.

In the field units the need for more medical officers was also remarked. In these, because of the limited personnel and the number of casualties, which was much greater than had been anticipated, patients received only the most conservative treatment. The fate of the wounded was largely influenced by the promptitude of their treatment and the adequacy of their treatment at that time. Every effort was made to secure it to them, but the pressure was sometimes so great that medical officers could not give the required attention because of their exhaustion. In a number of hospitals admissions were said to average 600 daily, for three, four and, in one case, five days, and in one hospital, inspected at Tusla, in November, 1914, admissions had numbered 6,000 in five days.

2. The station for light wounded quickly proved impractical and its operation as such was discontinued. It was then operated with the dressing station.

3. The depots for slightly sick continued in operation, after the troops began trench warfare, but accommodated comparatively few patients. It appeared that they were of greatest value to moving troops, for the accommodation of footsore men. When a depot moved forward, it turned such cases over to a collecting station, which was, in point of fact, a rest station, designated for the accommodation of transients destined to go either to front or rear.

4. Additional two-horse wagons were assigned to dressing stations and field hospitals for transportation of wounded and collection of supplies. The number of these additional vehicles was sometimes as high as twenty to a field hospital, but was usually from five to ten.

5. A water sterilizer and a mobile disinfection plant were added to each divisional medical unit and hospital.

6. The quantities of dressings and foodstuffs carried were increased. Wire splints were introduced. Tetanus antitoxin was issued to dressing and first-aid stations.

7. Heavy wagons provided officially were not, as a rule, replaced if lost or broken. Lighter peasants' wagons were used instead. One field hospital whose equipment had been lost in the retreat from Lemberg replaced it by fourteen native wagons carrying medical supplies, five carrying food, five ambulances, one omnibus to carry commissioned personnel, one rolling kitchen, and one kitchen wagon.

Reserve hospitals were allotted five or six ambulances each.

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Stationary Hospitals on the Line of Communication

The hospitals on the line of communication varied greatly in size and in organization. As far as possible they were grouped at the larger cities, at points toward the base, which were within the area of jurisdiction of the army commander. Those in each community were placed under the command of a medical officer who coördinated their activities and rendered a daily consolidated report to the chief surgeon of the line.

For example, on June 26, 1915, the following units were at Kolomea, Galicia, where were stationed the headquarters of the Seventh Army and the headquarters of its line of communication. These units were under the direct control of the chief surgeon of the line.

(1) Rotkowski surgical group, 240 beds, personnel, 8 doctors, 15 nurses, 34 men; (2) Field Hospital, 300 beds, personnel, 3 doctors, 1 pharmacist, 1 officer and 64 men of the hospital corps and 26 men of the train troops; (3) Field Hospital, 240 beds, personnel, 3 doctors, 62 men, 24 men of the train troops; (4) Reserve Hospital, 220 beds, personnel, 6 doctors, 10 nurses, 44 men; (5) Hungarian Red Cross, 250 patients, personnel, 2 doctors, 18 nurses, 34 men; (6) Epidemic Hospital, 200 beds, personnel, 2 doctors, 4 nurses, 32 men; (7) Evacuation Station, 70 beds, personnel, 1 doctor, 10 men.

Other units at this point directly under the jurisdiction of the chief surgeon of the line of communication were the dental office, an advanced depot of medical supplies, the sanitary commission and two auto ambulance columns. Later when the troops advanced, some of these units, *i. e.*, the field hospitals, went forward and were under the immediate jurisdiction of the chief surgeon of the army.

No evacuation hospital, as such, was provided in the Austrian service. The most conveniently located rest station or other unit organized from the reserves was expanded as required and, if necessary, operated in conjunction with neighboring hospitals as an evacuation station.

Hospitals, whether at the front or on the line of communication, occupied public buildings as a rule, favorite structures being local civil hospitals or school buildings. I was informed that since 1907 the larger school buildings erected in Austria-Hungary had been constructed with a view to their eventual utilization as hospitals in time of war. They certainly lent themselves admirably to that purpose. When buildings of this character proved inadequate, other permanent buildings were used or semi-permanent structures erected.

These latter were constructed, as a rule, of scantling and tar paper. Epidemic hospitals and large rest stations at railway stations which

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operated, in effect, as evacuation hospitals, were often built of these materials. Among others, a hospital made of scantling and tar paper structures, was inspected on the line of communication at Satoralja, Hungary (plan of this unit appended). At this time seventy-five huts were erected there, those for wards being 125 feet long, 30 feet wide, 10 feet high at the eaves, 18 feet high at the ridge and floored with cement. One foot from the tar paper walls was an inner shell of heavy brown paper which was said to promote greatly the heating of the buildings. The buildings were 25 feet apart and accommodated seventy-nine patients each. Some huts at Przemysl were semi-cylindrical in shape, 120 feet long, 20 feet high, 25 feet wide. They were made of wooden arches, the upper and under surfaces of which were about 2 feet apart. Boards were nailed on upper and lower surfaces and both covered with tar paper. These had ten windows on each side, each about 2 feet square and 10 feet from the floor.

A few huts of the Doecker type were seen, usually at the head of the line of communication. A typical one was 35 feet long, 17 feet wide, 8 feet high at the eaves, 10 feet high at the ridge. It was provided with a door at one end and four glass windows on each side, about 4½ by 3 feet. It required two wagons when moved, and about twenty hours for its erection. It accommodated twenty patients.

Other huts inspected in Tusla were made of frame material and roofed with tar paper. Each accommodated twenty patients.

The huts of some epidemic hospitals were 120 feet long, and 28 feet wide. They were divided transversely into wards, accommodating sixteen patients each. These wards had to be entered from the open air. In some such buildings there was a long veranda in front of the building. The reason for such construction was to facilitate segregation of different types of infectious diseases in small groups.

Huts erected for hospital purposes back of the head of the line of communication were usually floored with cement.

A hut used as a reception and forwarding station at Warenschenka was about 250 feet long and 35 feet wide. The ward occupied by enlisted men was divided by half walls into cubicles, accommodating about forty beds each. The total number of beds was 200 and as this occasioned crowding, they were arranged in groups of four, each bed being accessible from one side only. This arrangement enlarged the effective floor space.

Simple hot water plants were provided for a number of extemporized hospitals at the base and on the line of communication, in the proportion, usually, of one to a ward.

Some hospitals on the line of communication, *e. g.*, the reception

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hospitals at Maramos Siget, were equipped with an engine, mounted on wheels, so that it could be drawn by horses or could proceed by its own power. These engines were used for pumping water and for developing the steam used in the disinfection chamber.

Laundries of the large, newly erected stationary hospitals in the line of communication were equipped with all modern apparatus—mangles, centrifugal driers, electric irons, etc.

The kitchen of the hospital at Sateralya was typical for a number of hospitals on the line and at the base. Food was prepared in forty-eight large jacketed boilers, each containing 180 liters. These boilers were grouped in sets of four and were of the same type as those used in the commissary kitchen train, the railway mobile supply units, etc. They consisted of the jacket mounted on a concrete base, and which was, in fact, a fire box, a boiler which this jacket surrounded for three-fourths of its height, and around which the flames played freely, and a colander fitting into the boiler. This last contained all the solids used in preparing the food, and by means of it they were easily removed. One such jacketed boiler was provided for each ward and was refilled three times daily. The kitchen also was provided with stoves on which was cooked the food of the personnel on duty in the hospital.

Two items in the equipment of the hospitals in the line of communication were especially noteworthy. The first of these was a hastily built or adapted series of rooms, for cleansing incoming patients. They entered a disrobing room, when all their clothing was thrown into hampers, or through a door with a large closet which could be opened from the opposite side. They then received a bath and applied a 10 per cent naphthalene or sulphur ointment to all parts of the body, especially to all hairy surfaces. Thence they went into a dressing room and thence into a barber shop where hair and beard were clipped. Surgical cases went then at once to the dressing room where new dressings were applied. The ointment was reapplied daily for six days, since it had no effect on the ova of pediculi.

The second device was a disinfector for clothing; using the same principles as the rolling steam formalin disinfector, but furnished with closed steam pipes in its walls and with appertures above and below which could be closed when the chamber was filled with steam or formaldehyde. When clothing had been disinfected by steam, this was shut off from the chamber but continued to circulate in the pipes in its wall, while the air inlets and outlets of the chamber were opened. Clothing was satisfactorily dried and deodorized in fifteen minutes. When formalin was used, the exposure lasted 1 hour and the steam circulated only in the coil in the wall of the structure.

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Epidemic hospitals were erected whenever cases of infectious disease appeared in an army. Regulations provided that these units should be established at points aside from the line of communication, but in fact they were usually established on the outskirts of the most important or convenient stations on that route. Their location was published throughout the army. The maximum quota of inmates was usually fixed at about 200 patients, but in practice this varied widely and capacity was expanded or contracted according to circumstances.

All infectious diseases, cholera, typhoid, dysentery, etc., were treated in separate sections of these hospitals or in separate buildings. When special huts for them were not erected, these hospitals often occupied several buildings.

An adequate personnel, varying according to circumstances, was detailed from the reserve units and supplies and equipment were obtained locally as far as possible.

Hospitals on the line of communication and at the base were required to procure their supplies, if possible, from other sources than the supply depot, since these were supposed to carry material for the mobile army only.

At the base many hospital were established in factory buildings, convents, and public buildings of all kinds, while others occupied newly erected pavilions, similar to those at Sateralja. One of the finest extemporized hospitals inspected was the Bankers' Hospital in a factory belonging to the Ericson Company in the outskirts of Budapest. It had a staff of 12 doctors, 68 nurses, 72 orderlies, and 24 female employees, and accommodated 1,500 patients. Another, occupying the Art School and under command of Major Lumitzer, in that city, accommodated 300 patients and received the gravest surgical cases. It had a staff of 6 doctors, 20 nurses, and 40 orderlies.

The Elizabeth Hospital in Budapest, operated by the Hungarian Red Cross, and accommodating 1,700 patients, was one of the most active and well appointed units inspected. Other hospitals at the base which were particularly well known were the Garrison Hospital No. 1 in Vienna and the American Red Cross units; that in Vienna under Dr. Cary A. Snoddy and that in Budapest, at the time of my inspection under Dr. Wm. J. Crookston.

Convalescent camps were not camps at all, in the American sense of the word. They were permanent buildings in which from two to forty convalescent patients are accommodated. They were supported by public spirited people who accommodated patients in buildings on their estates, or in a part of their homes, providing all things necessary, if possible, or drawing needed dressings, etc., from the Red Cross.

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Patients were treated gratuitously by the local doctors who made visits as required. Most of the patients in such retreats were slight medical cases, and remained under treatment abut two weeks. In April, 1915, I was told that there were about 100 such camps in the neighborhood of Budapest, and about 300 in the vicinity of Vienna. They did not prove satisfactory, however, because of the relative lack of military control, and were being gradually discontinued.

Certain hospitals at the base, which I did not have permission to inspect, were devoted to particular types of cases. Among these were those accommodating cases of oral surgery, nerve surgery, orthopedic surgery, optic surgery, etc. The staffs of these hospitals were composed of specialists, whose results were said to be highly gratifying. One hospital at Neu Saudec, under Lieutenant Colonel Seidl, was devoted to plastic surgery of the face. Its purpose was to ameliorate the more repulsive lesions.

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AN EPIDEMIOLOGICAL STUDY OF AN OUTBREAK OF MEASLES, CAMP WILSON, SAN ANTONIO, TEXAS

By Lieut. Colonel EDWARD L. MUNSON

Medical Corps, United States Army

Division Surgeon, Twelfth Provisional Division

Part I

GENERAL

DURING the latter part of January, 1917, the month of February and part of March there occurred an outbreak of measles among the troops at Camp Wilson, San Antonio, Texas. The 13,773 troops concerned and the twenty-three separate organizations having their own individual administrative machinery within the camp were in sufficiently large number to permit of a comprehensive comparative study of the outbreak, of much accuracy and with many sidelights which should be of much value in illuminating the origin, prevention and control of measles outbreaks among troops in the future. The results of this study are here presented.

In all but two of the twenty-three organizations the measles has been absolutely controlled without spread by the observance of simple preventive measures. In these two regiments it became epidemic through neglect, inertia and disobedience of orders. These two regiments, totalling 2,411 officers and men, had 339 cases; the remaining 11,362 officers and men in the camp had but 105 cases. A comparative study of cause and effect, on a large scale and under identical conditions of environment, has thus been possible. It is believed that the lessons here drawn from this study can and should be made of great practical value in the prevention and control of measles outbreaks in the future.

The great sanitary importance of measles in our troops is pointed out in the Report of the Surgeon General of the Army for 1916, on page 14; and on page 53 of that report is given a chart showing that for the previous year the death rate from measles, 0.31, was the second highest in the army, being exceeded only by that for pneumonia, 0.42.

It is believed that the study of this outbreak has resulted in so much new information about the spread and control of measles, and the formulation of exact scientific measures based thereon, that such measles outbreaks as the Surgeon General's Report refers to need no longer be apprehended and the death rate from this cause reduced to a practically negligible factor.

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Source of Infection

The source of the measles outbreak here reported was the city of San Antonio, where it was extensively epidemic for some weeks before its appearance at Camp Wilson.

So far as the soldiers were concerned, the sources within the city were doubtless the moving picture shows and theaters of the poorer class, places of public resort, and, in some cases, private families.

During the entire outbreak in camp, measles continued to exist in epidemic form among the civilians of San Antonio, and new infections were constantly being introduced among troops from that source, adding to the difficulties of control of the military outbreak. Excepting in two regiments, this study indicates that the vast majority of the measles cases in camp were derived from outside sources.

Measles to be Classed with Respiratory Diseases

At the very outset, the writer desires to emphasize his absolute conviction that the long accepted but wholly symptomatic classification of measles as one of the eruptive fevers puts it in the wrong nosological category.

This classification was made more than two generations ago, without relation to pathology, at a time when the science of modern medicine was in its infancy. It has since been continued by medical writers through lack of evidence for its classification otherwise. On this wrong classification has largely depended the reasons why it has not been brought under logical and effective sanitary control.

But the writer has long believed that it should be classed as an acute respiratory disease, accompanied by fever and with an eruption which has no other importance than as a characteristic and terminal symptom. It occurs under the identical seasons and conditions in which colds, tonsillitis, bronchitis, influenza and pneumonia flourish. Outbreaks of measles are habitually preceded by the first three, and cases which are severe develop the latter. Though the cause of measles is not known, it unquestionably is excited into activity by the same causes which bring the accepted respiratory germs to a virulence—or the body to a lowered vital resistance—by which disease is developed. Outbreaks of respiratory disease, with a sufficient number of persons susceptible to measles, are therefore to be considered as warning of the measles outbreak to follow in the absence of proper repressive measures. Any conditions which will prevent or control epidemic respiratory disease will equally prevent or control epidemic measles. If true, this would be a most valuable health measure in preventing the spread of measles. That this contention is based on fact it is believed that the

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present paper will abundantly demonstrate, for the repressive measures which have proved so effective against measles are practically only the repressive measures against any respiratory disease, with the addition of quarantine.

Part II

Anticipatory Measures for the Prevention and Control of Measles in Camp Wilson

Preparations in Advance of the Outbreak

The outbreak of measles which occurred did not come either as a surprise or an emergency. On the contrary, it was expected and was planned for long in advance. About four weeks before the first case appeared, all the measures against a measles epidemic had been formulated and put into writing, and the detailed information which has made the conclusions of this study exact facts arranged for.

The writer had kept himself informed of the large amount of measles and other respiratory diseases existing in other camps along the border, especially those at higher altitudes, with the consequent large incidence of pneumonia, during November and December. The probability of a similar outbreak among troops at Camp Wilson was forecasted long in advance of its occurrence, and this became a certainty when "colds" and bronchitis began to prevail among the troops, while measles assumed an epidemic form in the civilian population of San Antonio.

It was realized at the outset that the wide spread of measles through the city of San Antonio, with its daily visitation by thousands of soldiers, furnished a constant reservoir of infection outside the control of the military authorities, from which new infections of the disease would be continuously introduced within the camp limits. A considerable number of cases of measles among the soldiers, due to exposure to infection while out of military bounds, was therefore recognized as inevitable.

But it was believed that intelligent repressive measures applied within the camp limits should prevent any camp epidemics and prevent the disease in soldiers from spreading to any great extent to other soldiers. It is believed that this study demonstrates that this can be —and was—done in every organization that will—and did—carry out orders. It also shows that discipline is the mainspring behind sanitation. It may be mentioned here that the two organizations of this division that through neglect, indifference or inertia failed properly to obey sanitary orders suffered severe epidemic outbreaks—the twenty-one other organizations that did as they were told had scarcely any recurrent cases traceable to an infection within the camp limits.

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In avoidance of the threatened respiratory and measles outbreak, the following precautionary measures were therefore worked out in advance and put into operation at once when required.

Conference of all Medical Officers of the Division

On January 4, just three weeks before the first measles case appeared, a conference with all the medical officers in Camp Wilson was held by the Division Surgeon, at which the provisions of letter of January 5 (following) were gone over, the probabilities of respiratory disease prevalence were discussed, and the great necessity for proper ventilation of tentage was emphasized. They were directed to confer with their regimental commanders and insist on proper sunning and ventilation of tents and contents. Some promptly undertook and effectively carried out these measures; and where this was done either respiratory troubles never developed, or, if they had started, they promptly fell to satisfactory ratios. Among these larger organizations may be mentioned the 37th U. S. Infantry, 16th U. S. Cavalry, 7th U. S. Field Artillery, 2nd Wisconsin Infantry, 3rd District of Columbia Infantry, 3rd Illinois Infantry, 4th Illinois Infantry, and 1st Minnesota Infantry. These regiments remained or became in a very few days practically free from all respiratory troubles, including measles. The general sick ratio for the Provisional Regiment, Field Artillery, the worst in the camp at first, became about the best, under intelligent administration, in a short time. When it left the camp, on March 6, it had the lowest rate of all the organizations therein.

Special Sanitary Orders

Following this conference of medical officers, the following letter was forwarded, and all paragraphs except 2, 3, 5 and 10 were incorporated into Bulletin 1, Hdqrs., 12th Provisional Division, January 8, 1917, and issued for the goverment of the troops of the division.

HEADQUARTERS TWELFTH PROVISIONAL DIVISION
OFFICE DIVISION SURGEON
CAMP WILSON, TEXAS

January 5, 1917.

From: The Division Surgeon, Headquarters Twelfth Provision Division.
To: The Commanding General, Headquarters Twelfth Provisional Division.
Subject: Respiratory diseases and tent ventilation at Camp Wilson.

1. There is now a large amount of respiratory disease in the camps along the border. Some of it is pneumonia and very fatal. In this camp it has so far practically been limited to tonsillitis, colds, influenza, and bronchitis. It is not believed that this more favorable condition will continue indefinitely unless special precautionary measures are taken.

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2. These precautions apply particularly to tent ventilation, and by proper change of air to overcome the conditions of overcrowding which otherwise exist in tent life where six or eight men occupy a pyramidal tent.

3. The recent hanging of doors in the tents of this camp has largely taken away all that remained of natural ventilating openings and has created an acute problem relative to ventilation.

4. The tents are now practically hermetically sealed, with no facilities provided either for the ingress of fresh air or the exist of foul air.

They are mostly habitually overheated, which results in chilling if the men have to go into the cold outside air.

The foul air, close contact and overheating favor the devlopment of colds, tonsillitis and bronchitis. This final combination favors the development of pneumonia. "Northers" are followed by a rise in respiratory disease. This is not believed to be due to the cold pure air of the "norther" outside, but to the too hot and foul air created and breathed by the men huddled within the tent for warmth.

5. The Quartermaster's Department, without apparently considering the sanitary question involved, has put a pyramidal cover of galvanized iron over the ventilating aperture of each tent and fitting closely to the canvas, completely blocking all movement of air. The natural and proper movement of hot foul air, up and out, is absolutely stopped. This blocking of air occurs at a season when ventilation is particularly necessary. In hot weather everything is left open for greater coolness, and free ventilation is the result. In cold weather the tendency of the average soldier is to close everything tight to conserve heat, and the tight apex cap that the Quartermaster's Department has recently installed has taken away the chief facility for ventilation.

This cap should be replaced at once by a new one, 4 inches longer and built on a wider angle so that the lower margins of the pyramid will stand away from the canvas of the roof by at least 2 inches. This gives an "overhang" of the metal cap which would keep out rain, yet allow a 2-inch space for the exit of foul air all about the cap, which in the aggregate would give about one square foot of ventilating aperture. This is merely an adaptation of the well-known system of ridge ventilation.

This matter of change in metal tent caps is one of much urgency and should be given attention at once.

6. Most of the tents are banked up. This prevents fresh dry air from passing under the tent and rising in it through the cracks of the floor to assist in ventilation. Where tents are so banked up, the earth should be shoveled away for a width of 1 foot on the northwest and southeast corners of the tent floor.

7. A piece of 2 inch by 4 inch should be nailed vertically to each wide wall of each tent, through its 4-inch dimension, so as to hold the canvas slightly away from the side and allow fresh air to enter through the resulting space, which it will do without draft. This will prevent the almost hermetically sealing up of the tent now about universal.

8. All cracks in the side wall boarding of the tents should be battened to prevent direct drafts from blowing over the cots of the tent occupants.

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9. With regard to overheating of tents, the command should be warned against it, as favoring the development of respiratory disease.

Company officers should be required to see that the men do not overheat their tents. Night inspections especially should be made to this end.

10. It is believed that eight men are too many for a tent under present conditions of permanent occupancy and poor ventilation. Where practicable, six should be the maximum.

11. The men have a practice of spitting in the earth-box surrounding the tent stove. This is dangerous as liable to spread the germs of respiratory disease. It should be prohibited.

As a further sanitary measure, the earth in the boxes around the stove should be taken out once a week and replaced by fresh.

12. It is very desirable to have all tent walls rolled up to admit sun and air while the men are at drill. Also all clothing and bedding should be sunned. This is only a temporary and half-way measure, but at least it will freshen up and dry out the tent and its contents and tend to destroy any respiratory germ life. It is believed that such sunning is more needed now than during the summer, when it was more generally carried out. G.O. 13, H.S.D., July 10, 1916, requires it without reference to season.

13. Many cots seem to be broken and the men are sleeping on the floors. It is claimed that materials to repair cots are not readily forthcoming. This should be supplied or new cots issued.

14. Attention is invited to G.O. 13, H.S.D., 1916, which requires that all sick having a temperature of 101 degrees or over shall be sent to hospital. Putting the numerous respiratory cases with such temperatures in hospital runs up the sick rate, but the rest and care conserve vital resistance, tend to ward off pneumonia and would undoubtedly save in death rate.

(Sgd.) E. L. Munson,
Lieutenant Colonel, Medical Corps, U. S. Army,
Division Surgeon.

As there appeared to be a prospect of considerable delay in remodeling the metallic caps of the tents in accordance with the foregoing recommendation, a letter was written by the Division Surgeon which resulted in the following bulletin:

Headquarters Twelfth Provisional Division
Camp Wilson, Fort Sam Houston, Texas
January 10, 1917.

Bulletin No. 2.

The following report of the Division Surgeon is published for the information of all concerned. The recommendation as to the removal of the galvanized iron plate will be at once complied with.

1. To meet immediate needs for better ventilation of pyramidal tents in preventing respiratory troubles, it would be of considerable service to remove the galvanized iron plate from the top of the truncated pyramidal cover which has lately been placed over the ventilating opening at top of tent. This plate can

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be slid off, furnishing a small ventilating outlet about 6 inches square. While this ventilating space is too small, smoke experiments indicate a quite rapid current of hot foul air rising through it, especially with a fire in the stove, which would be of material assistance in ventilation.

2. Pending any other arrangement, to permit ventilation and reduce respiratory troubles, it is recommended that the above be ordered.

. . . . . .

By command of Brigadier General Greene:

(Sgd.) D. F. CRAIG,
Captain, General Staff, Chief of Staff.

Official:

(Sgd.) CAMPBELL KING,
Captain, Seventh Infantry, Adjutant.

However, a large number of militia organizations did not carry out these requirements. Through alleged misunderstanding, one regimental commander suspended this order; the others issued orders in compliance therewith, but company commanders, first sergeants and squad leaders apparently obeyed them as they saw fit. Verification meant inspection and reinspection and report upon every tent in camp, by a sanitary inspector; for apparently some regimental surgeons were unable to secure complete action on this requirement within their organizations. Giving a reasonable period for compliance, inspection, reinspection and report took a very considerable time, during which there were opportunities for the spread of infection through lack of ventilation which meanwhile persisted. It was some weeks before this simple requirement was carried out by all. The only reason it was not done was lack of sufficient discipline to overcome the inertia.

It will be noted that these two bulletins were issued more than a fortnight before the first measles case appeared.

Following the orders for ventilation and sunning ensued a period of struggle to bring this about effectively. In many organizations it was at first not done, either in whole or in part. There was no refusal, but simple inertia and neglect. It was too much trouble, and the undisciplined commands did not seem to have inclination to enforce coöperative action. The tendency was too often merely "to go through the motions" in a perfunctory way and only sufficient to protect against penalty. Apparently everybody above the grade of private issued the proper orders, but few busied themselves in seeing these orders effectively carried out. The inspectors were active in touring the camp, commenting, advising, and calling attention to proper methods of sunning and airing. It almost seemed necessary to tell certain commanding officers daily that "the sun was shining" in order to get their

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tentage opened up to light and air. It took repeated inspections to get the ventilating openings made in the tent caps in many companies —some tent squads not complying until after repeated inspections— and the same in regard to provision of other ventilating openings. Inspection also showed numerous technical faults operating to prevent securing the results desired. One regiment in which hardly a bed had been made up while in the tents, showed rows of beautifully made cots exposed for sunning in the company streets, blankets carefully folded, and poncho or shelter tent carefully tucked around them and most effectively excluding light and air. Another regiment looped up the leeward and west side only, so that the men might have a windbreak (this on a day like summer), and during hours when the sun was southeast or south. Every conceivable method or excuse for neutralizing the purpose of getting the tents and contents sunned and aired seemed to be thought up in some organizations. Even some of those whose conditions were satisfactory under steady inspection reverted to insanitation as regards airing as soon as the pressure of inspection was relaxed.

Conference of the Colonels

Inasmuch as the rates for respiratory disease were not falling in an an entirely satisfactory manner in some organizations, as a result of lack of full compliance with Bulletins 1 and 2, the Division Commander, on request of the Division Surgeon, ordered all Militia colonels to come to Division Headquarters for conference on the threatening health situation.

This conference was held on January 16, or nine days before the first case of measles.

The threatening situation was explained to the Colonels, the relative health records of their respective regiments shown to them on the health charts, and they were urged to fully carry out the provisions of Bulletins 1 and 2, in spirit and letter. Most of them appreciated the importance of the matter and acted accordingly; two apparently did not, and their regiments paid the penalty of inertia.

Instructions to all Medical Officers

The first cases of measles occurred January 25, but were not reported to the Division Surgeon until January 27. The following Memorandum was immediately issued:

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HEADQUARTERS TWELFTH PROVISIONAL DIVISION
OFFICE DIVISION SURGEON
CAMP WILSON, TEXAS

January 27, 1917.

MEMORANDUM.

To all Medical Officers:

The first cases of measles to occur in Camp Wilson developed today. They were scattered, and apparently the infection was imported from diverse sources in town, where it is understood there are a good many cases. More cases from the same outside sources must be expected—but prompt and energetic measures will prevent cases developing in the camp from generally infecting the camp and causing an epidemic outbreak. The following instructions embody the essentials of prevention which should be strictly carried out.

Directions for action by regimental surgeons in case of occurrence of measles:

1. Report case in writing to Division Surgeon by special messenger.
2. Send case to Base Hospital at once.
3. Quarantine all members of the tent squad in their tent, until they can be sent to the measles detention camp.
4. Disinfect all clothing, bedding and equipment of the case. Those of contacts will be disinfected at the measles detention camp, to which they will accompany the contacts.
5. When the tent squad is ordered to the quarantine camp, send tent with the squad.
6. Take a census of the regiment, beginning with the infected company, to determine which men have had measles previously and which had not. Note the date when any previous attack of measles is said to have occurred.
7. Pay especial attention to catarrhal conditions in persons not having a previous measles history and hence presumably susceptible to it.
8. Have all cases of coughs and colds promptly report to the surgeon. Look up their measles record. In the presence of a measles outbreak, such cases in admittedly susceptible individuals are highly suggestive. Take temperature several times daily in such cases, watch the early symptoms and examine frequently for Koplik's spots. Cases of 101 degrees temperature are invariably to go to the Base Hospital.
9. When in doubt about the diagnosis, send the case to the Base Hospital as a suspect.
10. Remember that measles is by far more contagious in the stage before eruption. It is most important, therefore, that the diagnosis shall be early as well as accurate so that the sources of danger can be promptly eliminated.
11. For practical purposes, measles is spread by contact. The saliva, nasal and conjunctival discharges are the source of infection. Warn the men of the command about lying on each other's beds or pillows and using towels, pipes or other articles in common. Warn them to wash their hands frequently so as not to convey any infection thereon to their air passages. See that there are no common drinking cups. See that the water is boiling in which the mess kits are cleansed.

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12. See that tents are properly ventilated, their canvas is looped up every fair day, the bedding taken out and spread around so that sun and air can have full access to it. Spitting within tents should be strictly prohibited.

(Sgd.) E. L. MUNSON,
Lieutenant Colonel, Medical Corps, U. S. Army,
Division Surgeon.

Headquarters Twelfth Provisional Division, Camp Wilson, Fort Sam Houston, Texas, January 29, 1917. Copy furnished all medical officers for strict compliance.

By command of Brigadier General Greene:

(Sgd.) CAMPBELL KING,
Captain, Seventh Infantry,
Adjutant.

It will be noted that in the above memorandum disinfection of clothing and equipment is ordered. The writer does not believe that for measles any other disinfection than by sun and air is necessary. Like all respiratory diseases, the causative agent is doubtless very short-lived outside the body under conditions of light and dryness. But the psychology of the soldier had to be catered to. If he was ordered merely to spread his outfit in the sun and air, it would either be not done—or done ineffectively. But if his outfit were wet, he would of necessity have to spread it out to sun and dry before use. Soaking in plain water would do perfectly well for the purpose—but it was as easy to make up a solution of bichloride in a rubber poncho spread over a hole in the ground and wet the clothing in this solution. This was ordered. Thus the officer and man felt that something tangible in germ destruction was being done, probable assurance was made positively sure—and everybody was happy.

The measles census ordered above for the organizations is believed to be very important. It will not be absolutely accurate, for some men will not know definitely whether they have had the disease or not; and some will deliberately mislead, usually on the side of having had protection. Also it is not at all impossible to have attacks of measles after a first one, particularly if it be long ago and epidemic measles of virulent type be present. But in a general way it probably gives some idea of the amount and distribution of the measles susceptibles, and therefore of the liability to cases and local epidemics, and where to expect them. The measles susceptibility census required, obviously divides the command into two classes—one composed of men admittedly able to get the disease and the other of those not liable to acquire it. This information is particularly valuable in regard to making an early diagnosis and isolating cases in the infectious but pre-eruptive stage. The

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early symptoms, and especially to hospitalize all cases with temperature of 101 degrees, are particularly significant with the latter class, in which, in the presence of a measles epidemic, they raise a very strong presumption of this disease. These requirements sent many cases into hospital when in their most infectious stage and before a positive diagnosis could be made. Within from one to three days after removal to hospital the eruption would appear. No less than 98 cases sent to hospital merely as suspects later developed characteristic symptoms. This promptness of isolation relieved the camp of the same number of foci of infection and rendered control of the epidemic by so much the easier. It also got these men in bed earlier, gave them better care in the conservation of their strength, and doubtless vary materially assisted in averting a later development of pneumonia. As showing the value of accomplishing isolation of all contacts, the tent squads of the cases which were sent to the detention camp developed 74 cases of measles, which had thus through isolation been removed beyond the opportunity for infecting others.

Measles Quarantine Camp

A quarantine camp was established on January 27, the day the first case was reported, on the area vacated by the 7th Illinois Infantry, and the necessary mess shacks, latrines and bath houses already there were taken over. This camp lay between those of the 2nd West Virginia and 3rd District of Columbia, about a hundred yards from each flank. The Division Surgeon had requested that the isolation camp be established on the Aviation Field two miles east of camp, in conjunction with the measles isolation camp for post recruits. This request was approved by the Division Commander but denied at Department Headquarters, on a question of concurrent jurisdiction. The writer was not apprehensive that the measles infection would be air borne from the present camp into the adjoining regiments, but felt that such proximity would result with absolute certainty in breaches of quarantine and so expressed himself. To meet this objection, a guard was established. This did not relieve the apprehensions of the Division Surgeon, who had in mind past experiences with the indisciplinary proclivities of the soldier. That these apprehensions were well founded was demonstrated on February 25, when, on a tendency of measles to develop in the 2nd West Virginia, next to the measles detention camp, this regiment was investigated and the surgeon of the same reported that he had seen numerous visitors in the measles isolation camp the night before, had visited it, and found there some 30 visiting members of his own regiment, and ordered them back to their regiment. How long this

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practice had continued is not known, but doubtless for some time. Under cover of darkness, there was doubtless considerable visiting back and forth. One officer reported seeing a soldier ride up late at night from the city in a jitney and enter the isolation camp. The daily appearance of a crop of empty whiskey bottles indicated both free communication with the town and laxity of the guard. The cases in the 2nd West Virginia and in other regiments very likely came in a minor degree from wilful breach of this quarantine.

This incident furnishes a commentary on the wilfulness, indifference or ignorance of supposedly reasonably intelligent soldiers, who deliverately sought out and entered into the conditions where they knew that the measles infection was prevalent and in which they would be very liable to themselves contract the disease. No quarantine which depends on the human factor, as this one was required by higher authority to so depend, can ever be more than superficial and incomplete. In addition, there must be physical obstacles to communication, as distance, difficulties of approach, fencing, etc.

Rolling Up of Tent Roofs

To further meet the needs of the camp, and prevent modification or nullification of the purposes contemplated, it was officially directed, on February 9, to push the roof canvas of the house-tent back on the roof frame, so that it occupied an area about 6 feet square about the stove pipe. This opened up all hanging garments, etc., to sun and wind and let bedding and tent contents into direct sun and air. Directions required this canvas to be thrown back for two hours every fair day. It took a tent squad 3 to 5 minutes daily to roll up the canvas, and half that time to put it down in position. Five to seven minutes a day of the time of a tent squad was practically all that was necessary to keep it free from measles and respiratory disease. Most organizations carried out these simple precautions; and among these the infections introduced from outside never spread. This rolling up of the tent roof made interference with sunning and ventilation impossible. It also enabled the inspectors to tell from a distance, at a glance, whether or not sunning and airing were being carried out. Notice of neglect in these respects was frequently sent to commanding officers by telephone.

Arrangements with the Base Hospital

For full understanding with the Base Hospital relative to the measles developments expected, the following memorandum was written on January 30. Its requests were most fully complied with by Lieutenant

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Colonel Ireland, commanding the Base Hospital, and every assistance given by him and his subordinates in the efforts toward measles control.

HEADQUARTERS TWELFTH PROVISIONAL DIVISION
OFFICE OF DIVISION SURGEON
CAMP WILSON, TEXAS

January 30, 1917.

Memorandum for Col. Ireland.

MY DEAR IRELAND:

Captain ..... attached to Prov. Reg. F. A., has a considerable number of cases of tonsillitis in his organization which he is trying to wipe out, as per his attached letter.

Report also comes from the troop of Alabama Cavalry which has mumps, that a case in hospital five days and discharged yesterday has developed orchitis.

Doubtless the matter of the return of convalescent measles cases will shortly come up.

As all these are infectious cases, we are very anxious not to have them returned to camp until there is no question but that they are definitely cured. In other words if any question of their possible infectivity comes up, that they be given the benefit of the doubt and held in hospital. Can you not give instructions to that effect?

Relative to measles convalescents, it would seem desirable for the hospital to hold them until all catarrhal conditions have disappeared and until the temperature has been normal at least four (4) days. So far as any danger from desquamation is concerned, we can take whatever chance there is on that. Enclosed is copy of circular for control of measles, recently issued. We have had eleven cases divided among six organizations and distributed over six days. The source of infection is San Antonio.

(Sgd.) E. L. MUNSON,
Lieutenant Colonel, Medical Corps, U. S. Army,
Division Surgeon.

1 incl.

Conference with City Health Authorities

On February 2 the Division Surgeon visited the health office, San Antonio, Texas, and stated that since the first case of measles in camp on January 25, there had been, all told, eighteen cases of measles, distributed through seven regimental organizations and sixteen companies; that the incubation period of the disease showed that all these cases were derived from city infections and did not originate in camp; that the distribution showed that these sources of infection in the city were multiple and numerous. He stated that these sources were beyond his control, that he apprehended a measles outbreak from infection introduced from the various reservoirs of infection off the military reser-

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vation, and requested the city health authorities to take repressive measures—to include proper ventilation of all picture shows and places of public resort, quarantining of all cases, and of all contacts other than bread winners. This the city health authorities promised to do—saying that the measles prevalence in San Antonio was the greatest in its history, that many adults were being attacked, and that the Alamo Heights School, near the reservation, had been closed because of it.

Administrative Machinery

With the foregoing bulletins, conferences and letter, the administrative machinery for the prevention and handling of measles was completed. Incessant inspections by the Division Sanitary Inspector and the Assistant Division Sanitary Inspector, and at times by the Division Surgeon, were made to give this administrative machinery force.

Every possible assistance was given the work by the Division Commander, Brig. Gen. Henry A. Greene, U. S. Army, who kept himself constantly informed as to conditions and progress and supported the health officials in every possible way. Without the support which was so consistently given by him and by the officers of his executive staff, an epidemic of far greater seriousness would have resulted.

(*To be continued*)

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THE ILLINOIS CAMP OF MOBILIZATION, SPRINGFIELD, JUNE 19 TO AUGUST 7, 1916

By Lieut.-Colonel JACOB FRANK
Chief Surgeon, Illinois National Guard

(With six illustrations)

ON the morning of June 19, 1916, at about 4.45, I received the following telegraphic instructions:

Springfield, Ill., 2.55 a. m.,
June 19, 1916.

Lieut.-Colonel Jacob Frank,
2748 Pine Grove Ave., Chicago.

By direction of the Governor, and in conformity with instructions from the Secretary of War, you will report to The Adjutant General at Springfield, forthwith, for duty in connection with mobilization of the troops of Illinois.

(Signed) Dickson,
A. G., 4.25 a. m.

Similar orders were received by my secretary, Maj. Buell S. Rogers, M. C., and on the night of June 19, in company with Major Rogers, I left Chicago for Springfield, arriving the following morning at 6.30.

I proceeded at once to the State house in company with Major Rogers, and reported to Brig. Gen. Frank S. Dickson, The Adjutant General, who instructed me to report to Col. Stephan O. Tripp, quartermaster at the camp of mobilization. Later, in company with Colonel Tripp, Major Rogers, Dr. C. St. Clair Drake, Secretary of the State Board of Health, I made a thorough inspection of the grounds at Camp Dunne and Camp Lincoln. It was found that the sanitary work of the grounds at Camp Dunne had not progressed sufficiently to insure the health of the troops upon their arrival. In fact, the work of the construction of the latrines and shower-baths had just commenced. No facilities had been proposed for the proper disposition of the solid and liquid garbage, and in general, the sanitary condition of the camp was such that it appeared to me that the health of the troops would be greatly jeopardized unless further sanitary measures were adopted before their arrival, or, at least, that the measures then inaugurated be completed before the mobilization.

After the tour of inspection had been completed, I stated emphatically to Colonel Tripp that in my opinion it would be advisable for the troops to be delayed awaiting completion of sanitary accommodations, and that the health and possibly the lives of many an Illinois

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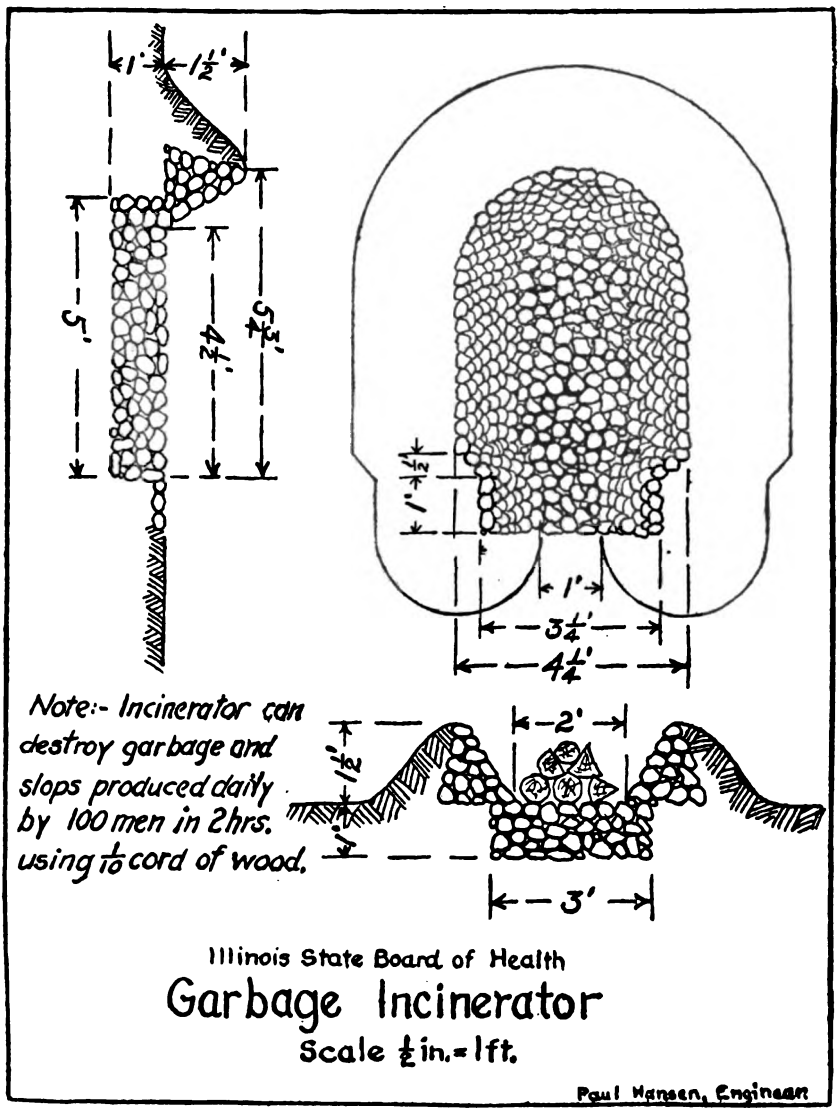
man would be saved by so doing. Colonel Tripp at once agreed with me that it was the better alternative and the matter was at once pre-



sented to General Dickson, at whose suggestion we called upon the Governor, Edward F. Dunne. When the situation was thoroughly explained to the Governor, he pointedly asked: "Is it your opinion

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that for the health of the troops, it is better to delay their coming?" Upon being reassured that a delay in mobilization was the better course to pursue, the Governor immediately instructed General Dickson to order the troops to be delayed at their respective armories for forty-eight hours. At the termination of the interview with Governor Dunne, about 4.30 p. m., the following official statement was made public:

1. In company with Maj. Buell S. Rogers, M. C., and Dr. C. St. Clair Drake, Secretary, State Board of Health, I visited Camp Dunne, State Fair Grounds, to inspect the sanitary conditions and the work being done along sanitary lines to prepare the said camp for the occupancy of the incoming commands.

2. We found this camp in excellent natural condition and that plans were in progress of consummation in the matter of latrines, shower-baths, etc., which, when finished will make a wholly satisfactory camp from a sanitary viewpoint.

3. We found, however, that in this work of preparation the heavy rains of the last twenty-four hours had retarded the work of sanitary installation. In view of this situation, and to the end that all sanitary precautions may be established, before the arrival of the troops, we recommend as necessary to this end a delay of the commands assigned to Camp Dunne, State Fair Grounds.

4. With respect to Camp Lincoln, we find that this camp, being a permanent military camp and prepared therefor, the sanitary conditions are satisfactory. In view of this, do not include Camp Lincoln in this recommendation.

(Signed) JACOB FRANK,
Lieutenant Colonel, Medical Corps,
Surgeon General, Illinois.

In compliance with General Orders No. 17, Camp Dunne, dated June 21, 1916, Brig. Gen. D. Jack Foster commanding, I was appointed post surgeon.

Upon assuming this office I found that no quarters had been provided at the mobilization camp for the post surgeon. I proceeded at once to find a suitable place to establish such headquarters, and with the authority of The Adjutant General, one wing of the Dome Building, which was unused, was selected. Before it was possible to use this space it was necessary to clean it out and scrub it. I then had to obtain desks and necessary office furniture in order to establish a workable headquarters. I further established and outfitted a dispensary, and after several days delay and work, and energy expended in this way, the office and department were able to start work.

SANITATION

The work of sanitation was rushed as much as possible, but at the expiration of the forty-eight hours it was still incomplete, although it

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had been carried on day and night. On June 22, at about 11 p. m., which was just about forty-eight hours after the troops had been ordered to remain at their armories, I was requested to report at the State House, to The Adjutant General. Upon my arrival, General Dickson requested a report upon the progress of the sanitary work at Camp Dunne. The general was informed that the work of sanitation was still incomplete and that the conditions were unsatisfactory, in general, for the arrival of the troops, and, that in my opinion it would be advisable to delay them for at least twenty-four hours longer.

The two, and only two important questions to be considered at this time were:

1. Shall there be a record established for the State of Illinois for the rapid mobilization of troops regardless of sanitary conditions at the camps, or

2. Shall there be a record established for the State of Illinois for preserving the health and saving the lives of the troops, by delaying their arrival until the sanitary conditions are such that practically all precautions have been taken to prevent all illness and especially "camp diseases."

It need not be stated that at no time was the question of quick mobilization given consideration by the Governor or The Adjutant General over the health of the troops.

The troops were again delayed for twenty-four hours at their armories, and by this means it was possible to have the sanitary work about completed before their arrival.

At Camp Dunne shower baths with proper drainage had been constructed, and the latrines were in a usable condition from a sanitary standpoint, with tops completely covered with wire screening and the sides boarded clear down to the ground to prevent the access of flies. There were ten latrines at this camp, with an average of approximately thirty-two seats each; seven garbage destructures, four devices for disposing of kitchen slops and eight shower baths with about 450 showers.

At Camp Lincoln there was one latrine of temporary type with approximately thirty seats, and two large permanent structures and three shower baths, large and sufficient to accommodate all officers and men.

Additional latrines were built on the basis of one seat for every twenty soldiers. These were somewhat more expensively built than necessary and were much too large for the needs of the camp, one seat for every forty soldiers would have been sufficient, therefore, owing to the lack of time for careful consideration the structures were not as economical of material as desirable. These latrines were burned out every day

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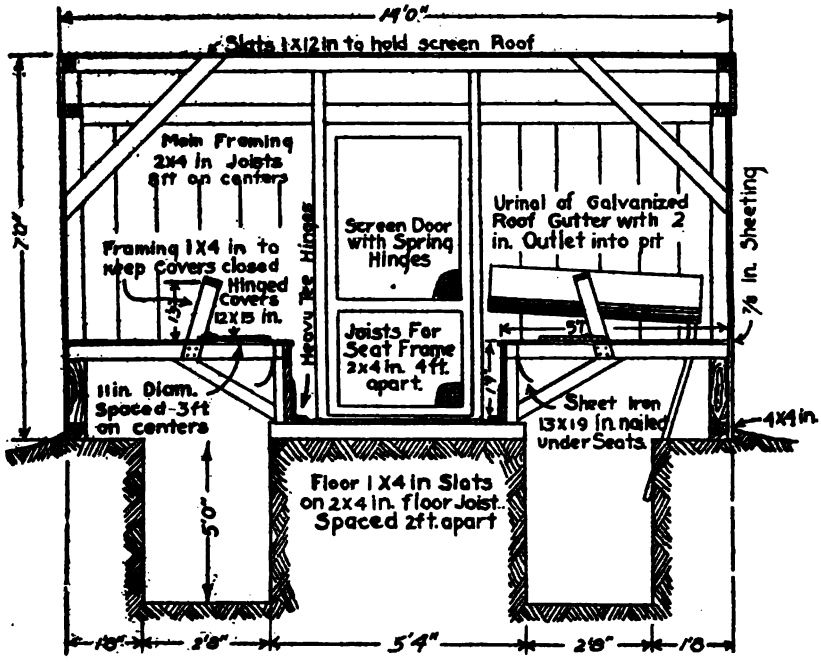
with crude oil to destroy excreta and to kill fly spores. (See Figs. 1 and 2, cross-section view of latrines and showers, respectively.)

The garbage incinerators were of a very simple type, patterned after the one recommended by Lieut. Col. Paul F. Straub, M. C., U. S. A., for field service, but with slight modifications, being built of burned brick entirely. They were chosen in preference to more elaborate forms,


14'0"
Slots 1x12 in to hold screen Roof
Main Framing 2x4 in Joists 8ft on centers
Framing 1X4 in to keep Covers closed
Hinged Covers 12x15 in.
Screen Door with Spring Hinges
Heavy Tee Hinges
Joists For Seat Frame 2x4 in. 4ft. apart
Urinal of Galvanized Roof Gutter with 2 in. Outlet into pit
7/8 In. Sheeting
7'0"
11in Diam. Spaced-3ft on centers
Sheet Iron 13x19 in nailed under Seats
4x4 in.
Floor 1X4 in Slats on 2x4 in. floor Joist Spaced 2ft. apart
5'0"
1'0"
3'0"
5'4"
2'6"
1'0"

Cross Sectional View of Latrines

Seats built in Units of 3 or 4 so arranged that they can be thrown forward on hinges crude oil and straw thrown into pit and deposits consumed by fire.

FIG. 1.

in view of the fact that the troops were mobilized so rapidly that only simple forms capable of being constructed of readily available material were permissible. (See Fig. 3, garbage incinerator.)

A device for separating the liquids and solid garbage was then found necessary as the sewers were not large enough to receive the solids. Leaching was suggested by me, but to Maj. M. L. C. Funkhouser, Q. M. C., Illinois National Guard, assigned to duty with the sanitary

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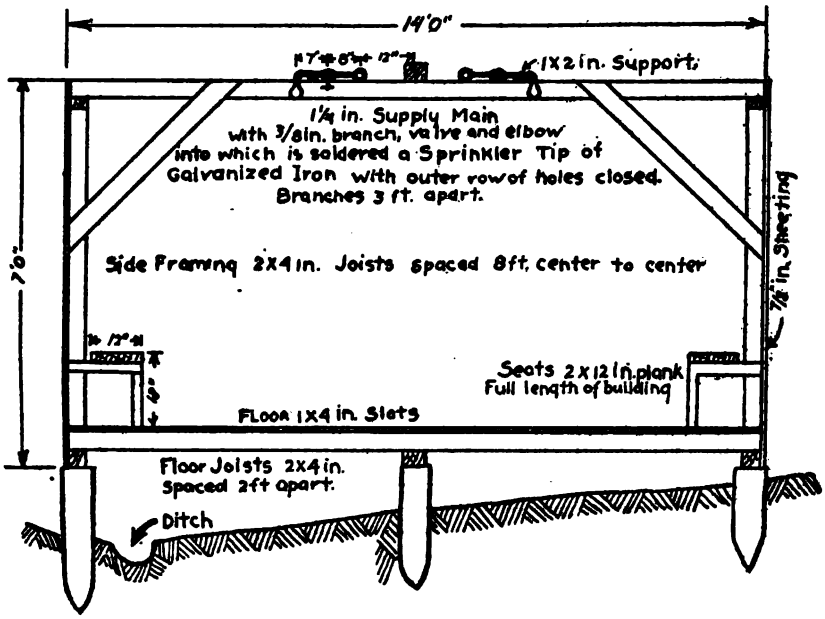
officer of the camp, is due the credit of designing a strainer for this purpose. The strainer was built of brick on brick manhole on farm tile, size 4 by 4 feet, walls being 8 inches thick. On front elevation was a hinged door through which the garbage entered. On the top was a removal lid of wood, size 4 by 4 feet by 8½ by 6 inches front end, to allow the removal of the drum inside when the screen clogged. At the base of the strainer, inside, was a removable conical drum of heavy galvanized iron sheeting with wire screen in the bottom, which sat directly over the manhole, size 2 feet 4 inches top edge square, by 2 feet 10 inches deep, with base


14'0"
1X2 in. Support
1¼ in. Supply Main
with ¾ in. branch, valve and elbow
into which is soldered a Sprinkler Tip of
Galvanized Iron with outer row of holes closed.
Branches 3 ft. apart.
Side Framing 2X4 in. Joists spaced 8ft. center to center
7/8 in. Sheeting
Seats 2 X 12 in. plank
Full length of building
Floor 1X4 in. Slats
Floor Joists 2X4 in.
Spaced 2ft apart.
Ditch

Cross Sectional View of Showers

FIG. 2.

1 foot 10 inches square. The space from the top of the conical drum to the wooden lid measured 2 feet 6 inches by 2 feet 6 inches by 1 foot 11 inches deep, and was lined with galvanized iron sheeting, also removable. This strainer proved to be very practical and serviceable. (See Figs. 4, 5 and 6, for diagram of strainer.)

On June 24, Maj. Buell S. Rogers was appointed sanitary inspector of the mobilization camp, which position he held until July 31. In connection with the duty performed by Major Rogers, I take pleasure in stating that owing to his untiring vigilance, determination and

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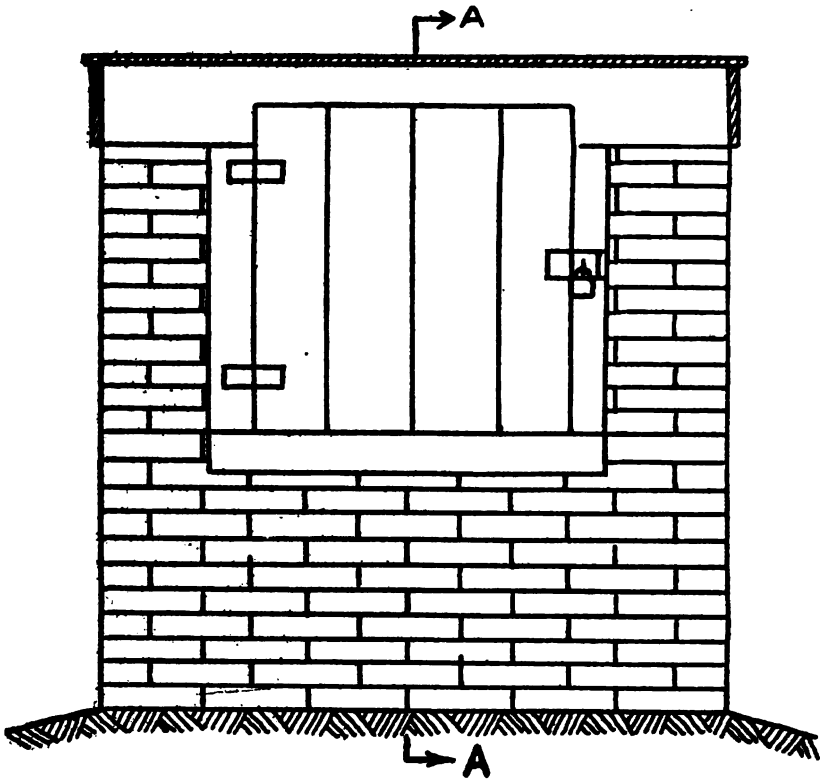
sincere interest in the health of the troops, the sanitation of the camps was kept as nearly perfect as it was possible to keep it. I may also say that when the troops had departed for the border the sanitary condition of the grounds was better than when the first troops arrived.

On June 26 I was mustered into the Federal service.



Front Elevation of Slop Sinks

As Camp Lincoln was a permanent military camp it had been decided to utilize this camp ground in connection with the State fair grounds, as has been stated before, and the First Cavalry, Signal Corps Company, Engineer Company and Field Artillery were assigned to this camp.

The First, Second, Third, Fourth, Seventh and Eighth Infantry regiments were assigned to Camp Dunne.

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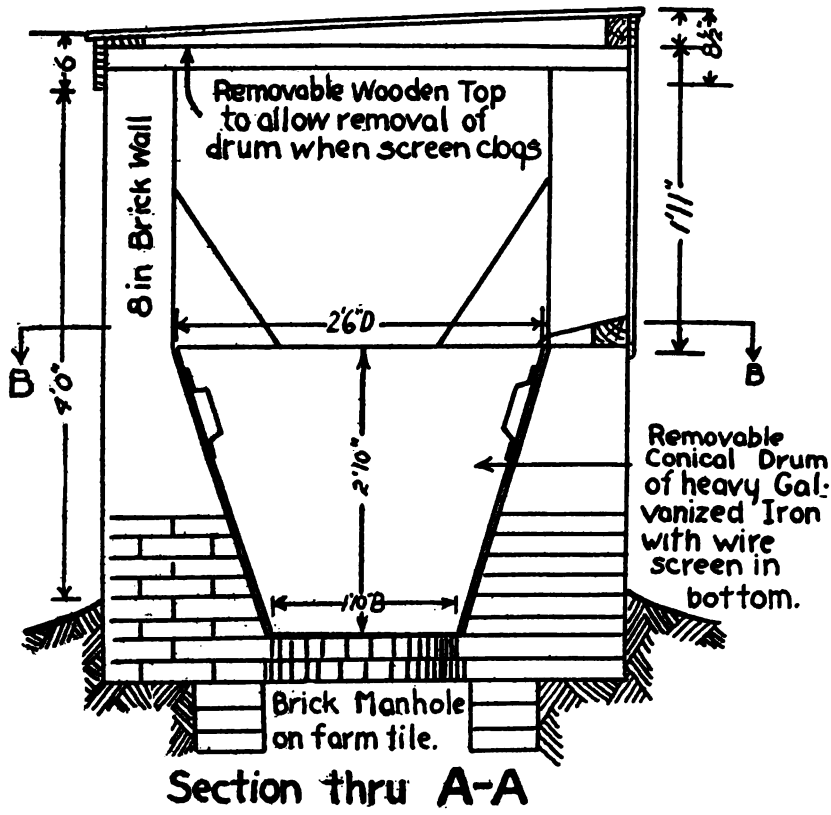
The barns at Camp Dunne which were to be used for quartering the First and Second Infantry regiments had dirt floors and were loaded with dust, manure, etc. These barns were swept and cleaned from top to bottom under the supervision of the sanitary officer. The Adjutant General procured from the city commissioners a detachment of the city fire department. This detachment was stationed on the grounds and placed at our entire disposal. The side walls of the barns were washed with the fire hose, and thoroughly cleaned. Several wagon loads of dust and dirt were piled up and carted away. The floors of the barns were sprinkled, shavings strewn and sprinkled again to lay the dust.



Back of these barns were mounds of dry manure which had been accumulating for years; this was all hauled away, the ground sprinkled with crude oil, and then burned to kill the fly spores. The manure between the quarters of the Third and Fourth Infantry regiments was

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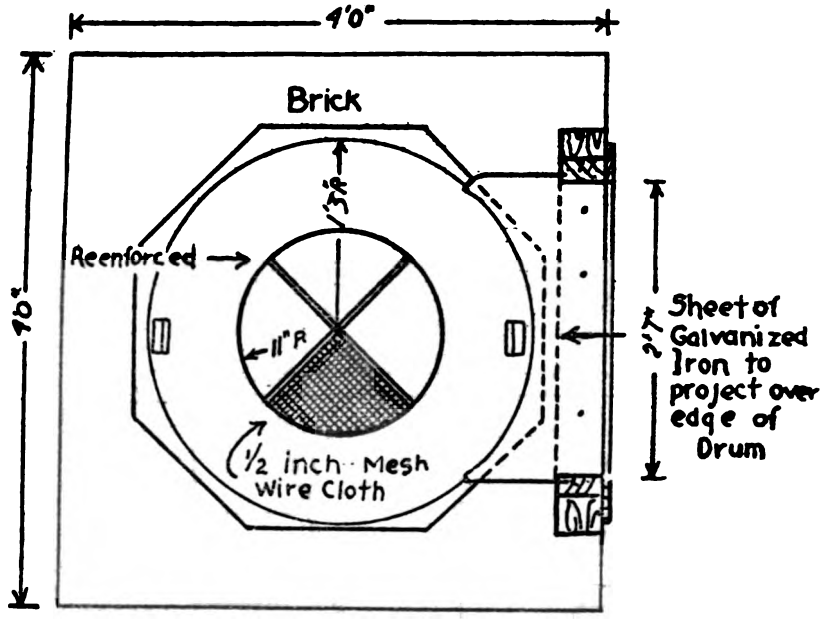
also forked over and burned with crude oil several times and then hauled away. The quarters for the Third, Fourth, Seventh and Eighth Infantry regiments were also renovated and thoroughly cleaned before the arrival of the troops.

The First, Second and Seventh Infantry regiments arrived at Camp Dunne June 23, the Third and Fourth and Eighth June 24. The First Cavalry, Signal Corps Company, and Engineer Company arrived at Camp Lincoln June 22, the Field Artillery June 23.



Section thru B-B
Showing Screen in Base of Conical Drum

FOOD SUPPLY, ETC.

Prior to the arrival of the troops it was found that the city water was usable and therefore, all wells at or near the camps were sealed or dismantled. The ice used was manufactured from distilled water. Ice cream, bakery goods, etc., were found to be of good quality. Several sources of milk supply were visited by me and found to be up-to-date and complying with the State and city regulations stipulated by their

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respective boards of health. Pasteurized milk only was furnished to all the troops.

The food issued to the troops was inspected daily and found to be of good quality and no complaints were entered of a deficiency of food supply with the exception, on July 18, 1,588 pounds of bacon and ham were found unfit for consumption and condemned by the sanitary officer. This was the only occasion where a large supply was condemned.

The commissioners of the State fair grounds issued sutler stand concessions and, in less than twenty-four hours after the mobilization was under way, dozens of these stands had sprung up like mushrooms over night. For the new soldier just entering upon the field of active campaign, a systematic diet regulation, along the line of accustoming the stomach to camp food, is extremely essential for the preservation of the health of the soldier. It was found that these sutler stands were not handling desirable foods, having for sale all kinds of viands—unripe fruits, greasy fried meats, sandwiches, cold drinks, peanuts and other things unfit for consumption by troops. No provisions were being made by them to prevent the access of flies, dust, etc. The owners were notified of the undesirable nature of their goods, and the places closed immediately and remained closed during the entire encampment. Due to the restriction and control of food and drink, stomach cramps, diarrhea, etc., were very noticeably absent.

MEDICAL EXAMINATIONS

The medical examination of the National Guard was begun on June 27 under the supervision of Maj. James M. Phalen, M. C., U. S. Army, assistant mustering officer for Illinois. The prearranged system for conducting these examinations was as follows:

(*a*) The examinations were held in the Dome Building, the main floor of which was large enough to easily accommodate a battalion in waiting, while the balcony space was utilized for the examination.

(*b*) Two groups, of eight medical officers each, conducted these examinations under the personal supervision of Major Phalen. One group occupied the space to the right and one to the left of Major Phalen, who sat at a large table as a central pivot. Each of these groups was divided into subgroups of one officer and one clerk and assigned to space equidistant apart in the balcony, so as not to interfere with each other's examinations. One of these groups was composed of officers of the Medical Corps, Illinois National Guard, and the other of the following named U. S. Army, Medical Reserve Corps, officers: First Lieut. James F. Presnell, First Lieut. Clarence L.

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Wheaton, First Lieut. E. C. Morton, First Lieut. John H. Hornsby, First Lieut. Arthur R. Reynolds, First Lieut. Henry F. Lewis, First Lieut. Francis Deacon, First Lieut. Albert H. Roler, First Lieut. J. G. Maxon.

(*c*) To each of these examiners was assigned a certain portion of the examination. The first examiner weighed the man and took his height and chest measurements; the second, tested the heart and lungs; the third, examined the skin and nervous system; the fourth, examined the impairment of bones and joints for flat foot and other deformities of the parts, for hernia, varicocele, vericose veins and hemorrhoids; the fifth, noted the condition of the nose and throat and also of the teeth; the sixth, tested the vision and the seventh, the hearing of the applicant; the eighth medical officer of each group separated the questionable cases from the unquestionable and referred the questionable cases to Major Phalen for final consideration.

(*d*) As a man approached the first examiner he handed the clerk assisting this examiner, a blank form, No. 10, with his name upon it. Upon this form the clerk entered the findings of the examiner to whom he was assigned, and passed it on to the second clerk, etc., each clerk in turn, entering the findings of his examiner. The cards were finally turned in to the clerk of the eighth examiner who turned over the cards to another clerk whose duty it was to carry these cards to Major Phalen.

Organization	Qualified		Net disqualified	Total mustered	Total rejections per cent
	Officers	Men			
1st Infantry	55	1,163	80	1,298	6.1
2d Infantry	53	1,089	139	1,281	10.8
3d Infantry	49	1,114	144	1,307	11.0
4th Infantry	51	917	162	1,130	14.3
7th Infantry	55	1,082	108	1,245	8.6
8th Infantry	48	1,078	234	1,360	17.2
1st Cavalry	48	1,162	84	1,294	6.4
1st Battalion, Field Artillery	18	438	75	531	14.1
2d Battalion, Field Artillery	15	466	44	525	8.3
Company A, Engineers	4	77	11	92	11.9
Company A, Signal Corps	5	91	5	101	4.9
Field Hospital No. 1	5	64	4	73	5.4
Field Hospital No. 2	5	61	3	69	4.3
Brigade headquarters	6	.....	.....	6	.....
Total	417	8,802	1,093	10,312	10.5

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From form No. 10 proper notations were taken and entered upon form No. 1 by Major Phalen and his assistants.

The tabulation given on the preceding page shows the result of the physical examination of Illinois:

The manner and efficiency with which these examinations were conducted is highly commendable. The system appeared to be well thought out and proved to be one of the best systems adopted so far as my knowledge goes. It enabled a maximum of work to be done in a minimum of time, and kept a constantly waiting line moving forward with unexpected rapidity. To the conduct of this work much credit is due for the prompt transfer of the troops from the mobilization camp to the concentration camp on the border.

To the credit of Illinois it has been noted that her National Guard was of such a standard of physical qualification that the number of disqualified men was second lowest of any State in the Central Department, the State outranking Illinois in this respect sent less than one-half as many troops to the border.

INOCULATION, VACCINATION, ANTI-TETANUS, ETC.

Circular No. 8, W. D., Division of Militia Affairs, dated May 10, 1916, advised the administration of typhoid prophylaxis, the first dose to be given as soon as possible after the men arrived at the mobilization camp.

As there were no supplies of vaccine and sera on hand and realizing the advisability of carrying out the above instructions, I placed the matter before General Dickson, and was instructed to purchase all the necessary material to meet the demands. I immediately communicated with the local drug concerns and the State Board of Health and was able to secure a sufficient amount to start the work of typhoid inoculation and smallpox vaccination immediately upon the arrival of the troops. Sanitary gauze, adhesive plaster and all accessories were also purchased. That there would be as little waste of material as possible, a certain number of inches of gauze and adhesive plaster to cover the site of the vaccination were figured for each man and issued accordingly.

On June 25, the following order was received from the War Department, office of the Surgeon General, Washington, but by the time the order arrived, the work of prophylaxis typhoid inoculation and smallpox vaccination was well under way:

Your attention is directed to the provision of Circular No. 8, W. D., office of the Chief of Staff, Washington, D. C., May 10, 1916, relating to the prompt administration of typhoid vaccination.

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The immediate vaccination against typhoid of all soldiers is of prime importance. There should be no delay. In case it is impossible to give but one dose of the antityphoid vaccine before leaving the mobilization camp, the surgeons of the respective organizations must be charged with the responsibility of giving the remaining doses at the first opportunity and reporting the completion of the vaccination in each case to the department surgeon. The office of the Surgeon General of the Army should be kept informed of the progress of the work and the necessary report regarding it rendered as early as possible.

The following table shows the number of doses of typhoid serum and smallpox vaccine administered, at the mobilization camp and completed en route or at the border:

Organization	1st dose anti-typhoid	2d dose anti-typhoid	3d dose anti-typhoid	Smallpox vaccination
1st Infantry	600	At border	At border	1,200
2d Infantry	602	1 at border	1 at border	1,132
3d Infantry	1,149	288 at border	288 at border	1,260
4th Infantry	996	996	996	1,120
7th Infantry	721	At border	At border	10
8th Infantry	999	939	782	1,140
1st Cavalry	.....	.....	.....	1,350
1st Btln. Artillery	504	504	504	1,050
2d Btln. Artillery	No record	.....	.....	.....
Field Hospital No. 1	5	2	2	125
Field Hospital No. 2	12	14	6	75
Signal Corps	120	120	120	150

Some of the organizations that were the last to leave the mobilization camp received their full number of doses before leaving, while those that left the camp within a few days after mobilization received only their first dose in camp and were supplied with typhoid sera and vaccine points to complete the treatment, and also were given a supply of antitetanic serum. It is worthy of making special mention here of the fact that cases of severe reaction from inoculation were few and of those that were reported, it was noted that the unusual reaction resulted from men using alcoholic beverages within twenty-four hours after the serum had been administered.

The total amount which it cost to provide the troops with typhoid prophylaxis, smallpox vaccine, tetanus serum and the medical supplies which were requisitioned by each of the twelve organizations that went to the border and purchased in open market, was approximately twenty-eight (28) cents per capita. A comparatively small amount of typhoid serum and smallpox vaccine was furnished by the Army Medical School

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at Washington, the cost of which is unknown, therefore, it is practically impossible to calculate the exact cost per capita but from data in hand, including an approximate valuation of this vaccine, the above figures were arrived at.

HYGIENE AND HEALTH

On June 24, an order was issued that men should report, under penalty, for venereal prophylaxis treatment within twenty-four hours after exposure. As a result very few cases of gonorrhea developed while the troops were at Camps Dunne and Lincoln.

Owing to the fact that there were a number of civilians employed at the camps, a guard detail of about twenty men from Company C, Fifth Infantry, was established in camp, and as Camp Dunne had been designated as the recruiting station for the State it was thought advisable to open a dispensary and an emergency hospital in connection with the headquarters of the chief surgeon. Both of these were maintained until camp was broken, August 13, and proved to be of inestimable value. After the troops had left for the border, a venereal prophylaxis station was opened for the guard detail and the recruits, in connection with the dispensary which was kept open day and night.

In all there were nearly two hundred minor cases treated at the dispensary, including broken fingers, burns, bruises, shoe blisters, stomach and intestinal disorders, poison ivy, heat prostration and several cases under observation before being sent to civilian hospitals.

About thirty-five recruits arrived at Camp Dunne from various parts of the State and these men were all given the typhoid prophylaxis treatment complete and vaccinated against smallpox before they left for the border. Their sick call was made at the dispensary. The detail of Company C was given typhoid prophylaxis treatment complete and vaccinated against smallpox.

Lectures were inaugurated and given by Lieut. Col. Thomas C. McCord, M. C.; Maj. Buell S. Rogers, M. C.; Capt. George U. Lipshulch, M. C., of the chief surgeon's headquarters, to the detail of Company C on personal hygiene with special reference to the "care of the feet of a soldier," and "prevention and care of gonorrhea." Lectures were given by Lieutenant Colonel McCord and Captain Lipshulch to the colored cooks and waiters and helpers of the officers' mess, on kitchen sanitation and personal hygiene. These lectures were much appreciated by the men and a decided improvement was immediately noticeable in the sanitation of the kitchen and in the service of the officers' mess. There was also a great improvement noted in the quarters and personal cleanliness of these men. They took such pride

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and interest that before leaving camp I was asked if I would give them a certificate for attending these lectures. I believe if more personal attention were given to the instruction of cooks and waiters, etc., better conditions would prevail in general.

The amount of sickness during the encampment was practically negligible. The total number of men who were incapacitated and treated either at the field hospitals or at the various local hospitals in Springfield, was thirty-one. The following table shows the classification and number of cases above referred to:

Disease	*No. of cases*
Pneumonia	3
Typhoid fever	1 (doubtful)
Hernia	2 (1 doubtful)
Heat exhaustion	6
Stomach and intestinal troubles	3
Insanity	2
Rheumatism	1
Gunshot wounds—received on duty	1
Appendicitis—sent home and operated	1
Scarlet fever	1 (doubtful)
Miscellaneous	10
	31

Seven of these cases were sent to St. John's Hospital, Springfield.

There was one death during the mobilization, a recruit committed suicide one day after his arrival in camp and the case revealed insanity in the family history. There were no deaths from any other cause.

PROPERTY

Shortly after my arrival in camp I was notified that the new practice of issuing the property for the Medical Department to the chief surgeon of the mobilization camp was to go into effect, and that stores had been sent me at Camp Dunne. Therefore, First Lieut. John A. Hornsby, M. R. C., U. S. Army, was assigned to take charge of these supplies The following is an abstract of the report of Lieutenant Hornsby submitted at the close of camp to me:

On June 24, I was ordered to report immediately to Camp Dunne, to the chief mustering officer for duty in connection with the examination of troops to be mustered into the Federal service from the National Guard. I performed the duties incident to this assignment until Thursday afternoon, June 29, when I was ordered to report to the chief surgeon for duty in the Quartermaster's Department. Immediately upon reporting I was handed invoices of goods that had been shipped from Jefferson Barracks, Mo., for the mobilization camp. I had the greatest difficulty in locating the car containing these stores, but did so on the following day when I found that the stores had been taken by the Springfield Transfer Co., and that part of them had been delivered in the streets

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of the 1st Infantry. Four cases of these stores had been taken to San Antonio, Tex., by the 1st Infantry, when this error was located.

In addition to the fourteen cases that had been delivered to the Springfield Transfer Co., I eventually found a car containing other medical stores consigned to the chief surgeon of the camp and I took charge of this car and had the stores removed to the quarters assigned for the purpose in the quartermaster's building at Camp Dunne. In addition to these stores I received at the same time a large bunch of keys said to belong to the hospital stores boxes but only a few of these boxes were locked, most of them being very insecurely closed and fastened either with nails or screws, although there were staples and hasps by which they might have been locked.

There were no orders of any kind for the disposition of these stores but I was handed three requisitions, one from Major Swift, Field Hospital No. 1, one from Major Blech, Field Hospital No. 2, and one from Captain Funck, attached to Company A, Signal Corps.

Just at that moment the 1st and 2d Infantry Regiments had already gone to San Antonio and it was stated the two regiments had to leave without medical stores. Four regiments of infantry, the 3d, 4th, 7th and 8th, were ready to go, also the 1st Cavalry and Company A, Signal Corps, and Field Artillery, and we were informed that Field Hospitals Nos. 1 and 2 might be ordered south at a moment's notice. It was presumed, therefore, that the supplies that had been sent to the mobilization camp were intended for distribution, so they were requisitioned to those units that were about to depart for what was supposed to be an invasion of Mexico. It was not understood by me that the stores were sent to the mobilization camp for any other purpose than to be used in filling requisitions for supplies and I made every endeavor to fill these requisitions.

When I was appointed quartermaster I was told that the office was a new department, medical, surgical, and hospital stores having been heretofore issued by the quartermaster general, and when I made inquiry of officers, medical and line, of the Regular Army, as to the regulations concerning the handling of such matters, I was told that there were no rules and that the department had not yet been standardized. . . . I did not understand that receipts were to be taken in quadruplicate. . . . On July 3, at 5 o'clock p. m., I was ordered to report to the chief surgeon of the Central Department at Chicago, and for the purpose was given a twenty-four hour leave of absence from the mobilization camp. Before I left Springfield, and on your order, I turned over my keys to the quartermaster department, all books and every article incident to my assignment to First Lieut. James F. Presnell, for which I took no receipt because such receipts would have contemplated a complete inventory for which there was no time. I arrived in Chicago on the morning of July 4, was detained at headquarters by order of Colonel Stephenson during the day for the purpose of allowing time for the interchange of telegrams as to whether or not the Medical Reserve Corps officers on duty at Springfield, including myself, were to be continued on active duty or relieved. At 4 p. m., of that day I was notified I was relieved, and to return to my home.

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In connection with the above I wish to add that considerable trouble and difficulty was experienced in the matter of storing these supplies. When I was notified that these stores were on the way I endeavored to secure a suitable place for their safe keeping. I applied to the camp quartermaster for space in the quartermaster stores building, which I had previously noted contained a separate compartment large enough to receive the stores consigned to me. This space at the time was not available and I proceeded to arrange an entirely inadequate place for these stores in the Dome Building. In this connection I was obliged to make request for guards to safeguard the property which apparently was at that time a difficult requisition to fill, therefore, I was advised that the space desired by me could now be utilized for storing medical property.

ANNUAL ENCAMPMENT

Fifth and Sixth Infantry Regiments, August 6.—After the departure of all the organizations for the border, the camp was given a thorough policing although the troops left it in a very satisfactory condition. The swine barns were designated to be used for the annual tour of instruction of the Fifth and Sixth Infantry regiments, which were not called into service. On account of a part of the Sixth Infantry being on strike duty at La Salle, this encampment was not held until August 6.

Before their arrival these swine barns were renovated and made ready for the quartering of these troops. The inside of the structure was disinfected with a 6 per cent cresol solution, swept and washed down with the fire hose and thoroughly cleaned under the supervision of Major Rogers, M. C. No camp diseases developed during this encampment.

MUSTER-OUT

On August 7, my duties having been completed, I requested to be mustered out of the Federal service, and Capt. George U. Lipshulch, still on duty, was assigned as post surgeon. On August 13, with the Hon. Edward F. Dunne, governor of Illinois, Brig. Gen. F. S. Dickson, The Adjutant General, and Cols. James K. Finn and Michael R. Kelly, aides to the governor, I started on a tour of inspection of the Illinois troops stationed on the border.

TYPHUS INOCULATION

Thinking that our troops might be called into service in Mexico, where typhus fever is prevalent in many spots and in the interest of safeguarding our troops against this dreaded disease, arrangements were

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consummated with Dr. E. Libman, of New York City, for typhus vaccine. Dr. Libman was in communication at the time with Drs. Harry Plotz, Peter K. Olitsky and George Baehr, who had just returned from Bulgaria where they had been carrying out a series of apparently successful experiments in inoculation against this dreaded disease. Good results from this inoculation had been reported, with danger from inoculation nil. Dr. Libman promised to supply me with the necessary amount of serum free of charge for the inoculation of all our men on the border. I think this would have been a step in advance for the security and protection of our troops against this terrible and ravaging disease. Correspondence with the medical officers from Illinois on the border evidenced a general feeling of willingness among the men to take this inoculation. Owing to the fact that arrangements were being made for our troops to return the matter was dropped before any definite action was taken.

RECOMMENDATIONS

I desire to state that the Medical Department received the coöperation of the governor and the officers of the National Guard and U. S. Army; all departments seemed to realize that the work of the Medical Department, and especially the sanitary work was of cardinal value, and it may be said, there was an earnest willingness to coöperate with the Medical Department to make the health of the officers and men of the camp of prime importance and to make the sanitary conditions as desirable as possible.

In closing my report I beg respectfully to be allowed to make the following recommendations, with my compliments to the commander-in-chief of the Illinois troops, Gov. Edward F. Dunne, The Adjutant General, Brig. Gen. Frank S. Dickson, and the U. S. Army officers of the Central Department:

1. That the Medical Department be given an opportunity to coöperate in the laying out of a prearranged plan for a camp of mobilization on ground previously selected and held in view as a place of mobilization.

2. That complete plans be drafted for the building of suitable latrines and shower baths, and designs prepared for modern scientific sanitation throughout the camp, these plans to be kept up to date and in readiness for a similar emergency.

3. That a noncommissioned officer of the Medical Corps, Regular Army, should be detailed with the chief surgeon of the camp to accomplish the paper work, etc.

4. That a regular army noncommissioned officer, Medical Depart-

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ment, a sergeant first class, familiar with handling property, be detailed for the purpose of assisting in the handling of the property consigned to the Medical Department.

5. That a competent butcher be assigned to the Medical Department, to assist in passing upon the meats and other perishable food stuffs, in order that no unfit foods be delivered to the organizations.

6. That from the practical experience of this camp, it would be advisable and practicable to establish in the summer instruction camps, a scheme for the instruction of the Medical Department, officers and men, on the basis of the plan used in the colleges today, in educating in the department of business whereby theories are put into actual operation and the *modus operandi* worked out, and not theorized on paper.

7. I urgently recommend that in establishing a mobilization camp, suitable quarters as headquarters for the chief surgeon of the camp be provided with all necessary office equipment for the transaction of the complicated duties of this department, at the same time quarters for other departments are established.

8. That forms for paper work for the National Guard be the same as those adopted by the Regular Army, at all times.

9. That proper regular army forms for issue of property should accompany the stores supplied for issue, and be included as a part of the original shipment.

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EFFECTS OF SUBMARINE DUTY ON PERSONNEL

By Assistant Surgeon WALTER W. CRESS

United States Navy

THE hygiene of submarines and the effects of the service on the personnel affords an interesting field for observation and study. A review of the available literature has revealed little of importance concerning the effects of this branch of the naval service on the men employed therein. This paucity of literature is probably due to the fact that many governments have jealously guarded reports of investigation pertaining to this branch of their naval services.

Many of the following observations were made at sea and under conditions anything but conducive to enthusiasm so essential in work of this kind. However, it is felt that the data obtained is as approximately correct as could be obtained under the circumstances.

The trip during which many of the observations were made began at the Naval Station, Pearl Harbor, Hawaii, at 10 a. m., on November 26, 1916, and ended at the same place at 6.30 a. m., on November 30, 1916. The trip was the regular quarterly ninety-hour test run; the routine of which was as follows:

Forty-eight hour surface run, speed about 11.5 knots.
Three hour submerged run, speed about 8.5 knots.
Charging batteries and air flasks at anchor.
Two hour full power run, speed about 14 knots.
One hour full power submerged run, speed about 10.5 knots.
Charging batteries and air flasks at anchor.
Return to base.

At first it was thought feasible to observe the physical condition of each member of the crew before, during and after completion of the trip. This was found to be impracticable owing to the fact that not more than one-half of the crew would be available at any one time. Therefore, ten men were selected by the commanding officer. Four were selected from the machinists, one from the electrical force and five from the gunners.

BACTERIOLOGICAL ESTIMATION OF AIR OF SUBMARINES

In order to arrive at any definite conclusions as to the bacterial content of the air of the different compartments of submarines it is necessary to make determinations under the different conditions under which a submarine may be acting, namely, along side of dock or at

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anchor, under way on surface and under way submerged. Many different devices for determining the number of bacteria in the atmosphere are in use. These vary from the simple method of exposing Petri plates containing agar or gelatin, to the more elaborate methods in which a definite amount of air is passed through a filtering substance such as sugar.

The Petri dish method probably gives results nearly approximate to those obtained by the more elaborate devices. Plates containing agar and having an area of 100 square centimeters were exposed for five minutes in the various compartments of the submarine under conditions and with results as shown in the following three tables.

TABLE 1.—*Submarine Moored at Dock. One Hour before Getting under Way*

Compartment	Time of exposure	After forty-eight hours		Number of men present during exposure	Cubic air space	Organisms per cubic meter
		Bacteria	Moulds			
Torpedo.....	5	30	4	3	1,980	3,400
Forward battery..	5	7	4	2	1,680	1,100
After battery.....	5	32	20	2	1,680	4,200
Engine and dynamo	5	20	8	1	1,000	2,800

Remarks.—The hatch was open in the torpedo, after battery and engine and dynamo compartments. An electric fan was running in the forward battery compartment.

TABLE 2.—*Submarine under Way. Thirty-six Hours at Sea*

Compartment	Time of exposure	After forty-eight hours		Number of men present during exposure	Cubic air space	Organisms per cubic meter
		Bacteria	Moulds			
Torpedo.....	5	1	2	6	1,980	300
Forward battery...	5	2	None	5	1,680	200
After battery.....	5	10	2	4	1,680	1,200
Engine and dynamo	5	3	1	5	1,000	400

Remarks.—A 4-inch ventilator in the torpedo compartment. Electric fan was running in the forward battery compartment. All food was prepared and eaten in the after battery compartment. Engines were running.

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TABLE 3.—*Two Hours and Thirty Minutes after Beginning Three-Hour Submerged Run*

Compartment	Time of exposure	After forty-eight hours		Number of men present during exposure	Cubic air space	Organisms per cubic meter
		Bacteria	Moulds			
Torpedo	5	1	None	7	1,980	100
Forward battery	5	3	None	5	1,680	300
After battery	5	5	None	3	1,680	500
Engine and dynamo	5	None	None	5	1,000	None

Remarks.—In the torpedo and forward battery compartments the batteries were ventilating inboard. There was an odor of H_2SO_4 fumes in the after battery compartment. In the engine and dynamo room the temperature was 92° F. wet bulb 90.

If the results as shown by the above tables are anywhere near approximate to the actual conditions, the number of bacteria present in the air of submarines is far below that of dwellings and battleships as may be shown by comparing Tables 2 and 3 with Tables 4 and 5.

TABLE 4.—*From Harrington and Richardson's Hygiene. Experiments of Carnelly, Haldane and Anderson*

Character of air space	Number organisms in cubic meter	
	Bacteria	Moulds
External air	600	200
Four-roomed house	8,500	400
Two-roomed house	43,000	2,200
One-roomed house	58,000	1,200

TABLE 5.—*Examination of air of U. S. S. Delaware by Surgeon Holcomb. U. S. Naval Medical Bulletin, July,* 1916

Compartment	Time of exposure of plate	Forty-eight hours incubation		Men in compartment	Cubic air space	Bacteria per cubic meter
		Bacteria	Moulds			
	Min.					
Outside air	5	1	.....	.....	.....	2,100
B 102	5	9	12	14	4,400	1,400
Brig space	5	3	.....	0	1,844	300
Gun deck space	5	14	.....	25	14,000	1,400

The statement is frequently made that the number of micro-organisms present in a given space varies in number with the efficiency

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of ventilation. This certainly does not hold true in the case of the submarine while submerged, for then the ventilation is the poorest while the number of microörganisms is greatly reduced as compared to the number present when ventilation is at its best. It is probable that other factors will have to be found to account for the low bacterial count, especially while running submerged.

It is hard to conceive that the amount of sulphuric acid fumes given off by the batteries during a submerged run would have a deleterious effect on the bacteria present. It is probable that the lower count may be attributed to the high humidity and absence of dust particles. In other words the same conditions that make for a sterile atmosphere within sewers contribute to the low count within submarines while submerged.

The low bacterial content of the air of submarines while cruising on the surface is undoubtedly due to the aspirating action of the engines and suction of the ventilators leading from the battery compartments into the batteries. An idea of the aspirating effect of these battery ventilators may be obtained by observing the large amount of dust that accumulates around their screened openings.

VENTILATION AND HUMIDITY

The air within the submarine, throughout the trip, while far from meeting the requirements generally accepted, was better than one would expect to find in this class of vessel. The greatest trouble in ventilating the boat was experienced while in moderately rough seas, owing to the fact that all hatches excepting that one leading into the conning tower had to be closed. Under these conditions it remains for a small 4-inch ventilator to supply air for the two forward compartments which are always occupied by at least two-thirds of the crew. This defect might be remedied to a large extent by the installation of a larger ventilator. This defect applies to all submarines of this flotilla and probably to all vessels of the K type.

A source of pollution of the atmosphere within and surrounding the submarine mentioned by others, but which I think should be emphasized, is that coming from the exhaust of the engines and the venting of fuel tanks inboard. Frequently while charging batteries along side of the dock, at anchor or while running awash the fumes of unburned oil arising from the exhaust are blown forward over the bridge and through the hatches into the boat. At such times the odor of oil is quite noticeable. I believe that these fumes when inhaled in sufficient concentration are liable to give rise to a transitory form of albuminuria. During the past year I have observed four cases presenting mild forms of albu-

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minuria after a short exposure to these fumes. In every case the examination of the urine revealed no albumin after a few days rest away from the submarine.

On account of the inadequate facilities for conducting the tests the carbon dioxide estimation of the air within the various compartments was not attempted. Nor were these estimations considered necessary. In considering the air of submarines the CO_2 content probably bears no relation to the amount of organic matter and toxic gases present. Furthermore, the amounts of CO_2 and organic matter present probably have no relation to the discomfort felt while the submarine is running submerged. This fact is very well demonstrated during the three-hour and the one-hour submerged runs. The wet and dry bulb readings and condition of ventilation of the various compartments of the submarine were the same at the beginning of both submerged runs. However, the physical discomfort experienced during the one hour submergence greatly exceeded that of the three-hour run. This was due to the fact that a greater speed was maintained during the latter run and necessitating a higher rate of speed of the dynamos, a higher temperature and more rapid evaporation of the battery fluid, giving rise to a higher humidity of the atmosphere of the submarine. At the beginning of the three-hour submerged run the outside temperature was 74° F., wet bulb 70, barometric pressure 30.06, relative humidity 79. Inside of boat before closing hatches the temperature was 78° F., wet bulb 75, relative humidity 84. At the end of two hours and thirty minutes the dry and wet bulb readings in the various compartments were as follows:

TABLE 6.—*At End of Two Hours and Thirty Minutes of Three-hour Dive*

Compartment	Dry bulb	Wet bulb	Relative humidity	Remarks
Torpedo	84	78	82	
Forward battery	88	84	81	Batteries ventilating inboard.
After battery	89	86	85	Batteries ventilating inboard.
Engine and dynamo	92	90	91	

TABLE 7

Number	Temperature	Pulse	Respiration
1	100.	96	23
2	99.4	94	22
3	99.6	?	?
4	99.4	84	20

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At the end of two hours and thirty-five minutes the temperature, pulse and respiration were taken of the four men on duty in the engine room. These men had been in that compartment from ten minutes to one hour. (See Table 7.)

At the beginning of the one-hour submerged run the outside temperature was 72° F., wet bulb 68, relative humidity 79. Inside of boat before closing hatches the temperature was 80° F., wet bulb 76, relative humidity 80. At the end of forty-five minutes after beginning dive the dry and wet bulbs in the various compartments gave the following readings:

TABLE 8.—*Forty-five Minutes after Beginning One-hour Dive*

Compartment	Dry bulb	Wet bulb	Relative humidity	Remarks
Torpedo	85	83	85	
Forward battery	89	87	90	
After battery	93	91	91	
Engine and dynamo	96	95	93	

Fifty minutes after beginning one-hour submerged run the temperature, pulse and respiration were taken of the three men then on duty in the engine room.

TABLE 9.—*Fifty Minutes after Beginning One-hour Dive*

No.	Temperature	Pulse	Respiration
1[1]	101	110	24
2	102. 2	128	?
3	102	130	?

[1] Same as No. 1 on the three-hour run.

The above observations agree in substance with those made by Surgeon Pleadwell who has proved beyond a doubt that the subjective sensations and feelings of discomfort experienced by those who are confined in closed compartments, inadequately ventilated, are due to a steadily increasing relative humidity.

PULSE, RESPIRATION AND BLOOD PRESSURE ESTIMATIONS

Blood pressure readings were taken on ten members of the crew before starting on the ninety-hour cruise, and at the end of the three-

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hour submerged run. The results of these estimations are shown in the following table:

TABLE 10

No.	Duties	Age	Sub-marine service	Before run			After run		
				Pulse	Resp.	B. P.	Pulse	Resp.	B. P.
			Years						
1	Machinist	45	1	78	18	124	80	20	110
2	Machinist	22	2	68	18	118	80	20	100
3	Gunner	23	1	76	19	132	90	22	120
4	Machinist	29	1	80	19	112	86	20	105
5	Electrician	28	2	80	18	150	86	24	136
6	Gunner	25	3	64	17	118	84	19	120
7	Gunner	32	2	78	18	122	76	18	118
8	Gunner	28	½	72	18	118	86	20	120
9	Machinist	24	2	82	19	138	86	20	138
10	Gunner	31	1	76	18	142	84	21	126

Average blood pressure before run, 128.4 mm. hg.
Average blood pressure at end of three-hour dive, 119.3 mm. hg.

All readings were taken with the man in a recumbent position and with the arm in position of supination. The arm was free from all clothing. The compression bag was carefully secured on a level with the heart. Unfortunately the diastolic pressure was not recorded. The Tagliabue was the instrument used.

It is now agreed by all workers that the auditory method of taking blood pressure readings is far superior to any other, however, on account of the noise it was impossible to use the stethoscope. It is felt the above is far too small a number of estimations to draw any definite conclusions as to the effect of submarine duties upon blood pressure. However, it is quite probable that these findings are typical of what really occurs.

I am of the opinion that long continuous duty on submarines is conducive to high blood pressure. Whether this is due to mental strain, loss of sleep, overeating with lack of exercise, excessive use of tobacco, coffee and tea, or some toxic agent peculiar to submarines I am unable to say. It is noted that a slight fall occurred after the forty-eight hour surface run and the three-hour dive. Undoubtedly this could be accounted for by fatigue or lack of all physical exercise during the preceding forty-eight hours.

Surg. Lovel Moss, of the British Navy, in estimating the blood pressure of a large number of sailors came to the conclusion that, "Age for age the blood pressure in seafaring men is higher than obtained in the average healthy shore-going individual." He attributes this to a

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combination of factors the most important of which are: overeating, alcohol, tobacco, tea, coffee, nervous strain, mental worry and anxiety.

In order to compare the average blood pressure on men on duty on submarines with sailors of a cruising ship, blood pressure readings were made of fifty men who had seen one or more years' service on submarines and fifty men who had seen no service on this type of vessel. The results are shown in the following table:

TABLE 11

Service	No. men	Average age	Average length of service		Average blood pressure	
			Navy	Subs.	Systolic	Diastolic
Submarine.....	50	22 yrs.	6	1.8	123	79
Cruising vessel.....	50	24 yrs.	9	.....	119	80

Lee, in an examination of 662 young men at the age of eighteen, or an average of four years below that of my series, found that the average systolic pressure was 120 mm. and the average diastolic pressure was 80 mm. Eighty-five of these had a systolic pressure of 140 mm.

Woley, in a series of 1,000 cases came to the conclusion that the average systolic pressure for males at all ages was 127.5 mm. It is quite probable that the average age in Woley's series of observations was far above the average for ages of the naval personnel. Rowan, in estimating the pressure of fifty persons between the ages of twenty and thirty found the average systolic pressure to be 125 and diastolic 81.

In an examination of 150 convicts between the ages of twenty-one and forty-five, I found the average systolic pressure 125 mm. and diastolic 85.

LOSS OF WEIGHT AND AMOUNT OF FOOD CONSUMED

Men attached to submarines frequently complain of loss of weight during long cruises. Occasionally men report at sickbay after a cruise and state that they have lost as much as 15 pounds. In order to ascertain the loss of weight that occurs, if any, ten men were weighed just before leaving on the ninety-hour trip and again immediately after returning. As may be seen by referring to Table 12, a small loss occurred in every case.

This small loss of weight probably has no relation to submarine duty *per se*, as probably a similar loss occurs in every one during the first few days at sea. Lack of exercise, exposure to extreme heat and a humid atmosphere probably tend to diminish appetite and the powers of digestion. On the trip in question it was observed that very little

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food was consumed during the first eighteen hours. About 50 per cent of the crew suffered from seasickness during the first six hours of the trip.

TABLE 12

No.	Beginning trip	At end	Loss	Gain
1	160¾	155½	5¼	.....
2	157¾	157½	¼	.....
3	156	151	5	.....
4	152½	150	2½	.....
5	139	135	4	.....
6	136½	134½	2	.....
7	155	153	2	.....
8	195	189½	4½	.....
9	168¾	163	5¾	.....
10	146½	144	2½	.....

Average loss in weight, 3¾ pounds.

In order to ascertain the actual quantity of food consumed on the trip, each article was accurately weighed before placing on board submarine. The amount of food in weight remaining at the end of the cruise plus 25 per cent as refuse and waste was deducted from the amount issued. The amount actually consumed furnishing 4601.5 calories per man per day.

EFFECTS OF SUBMARINE DUTY ON HEARING

There is probably no occupation, excepting that of a boiler maker giving rise to as many cases of partial deafness as submarine duty. It is not uncommon for men to report to the medical officer and state that they are having more and more difficulty in hearing the commands of their superior officers.

The following history is usually obtained. These men state that hearing was always apparently normal before being assigned to submarine duty. After a few months they notice they are having some difficulty in hearing what is being said in their immediate vicinity. At first this is only observed while the boat is being submerged and the pressure within is gradually increasing. This increase in pressure being due to the escape of air from the tanks into the boat. It is said to be equal to about 1 inch or ½ pound. Tinnitus, feeling of stuffiness within the ear and disturbances of hearing are the subjective symptoms usually complained of. There is frequently a sensation of crackling as the pressure on both sides of the typanum becomes equalized.

At first, the symptoms may disappear upon coming to the surface, but after a few months they become more or less stationary. An

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examination of the ear has failed to show anything characteristic aside from the usual findings in a case of chronic otitis media. In one case there were deposits of a chalk-like substance upon the drum membrane. Frequently the tympanum has the appearance of being thickened and slightly retracted. The pharynx and epipharynx often show chronic catarrhal changes. In no case has there been observed a perforation of the drum head. The condition is usually bilateral.

The functional tests show all degrees of disturbance of hearing. In one case there was inability to hear the tick of a watch at a distance of 8 inches. It has been impossible to carry out the numerous functional tests owing to the inadequate otological equipment. In one of the cases referred to an aurust, the bone conduction was found to be slightly increased.

The treatment of this condition has been without results. In fact very little has been attempted aside from pneumo-massage of the ear drum and treatment of the pharyngitis. The writer is of the opinion that the condition is an occupational deafness and is incident to a combination of causes, the most important of which are as follows:

(*a*) The constant vibratory movement of the submarine.

(*b*) The constant straining of ears to hear above the noise of the engines.

(*c*) Cold draughts of air down through hatches while operating on surface and excessive heat generated by motors while running submerged. These conditions are ideal for the production of epipharyngeal and middle ear catarrh.

(*d*) Inhalation of gases given off by the batteries and fumes from oil tanks are undoubtedly active in the production of epipharyngeal and middle ear catarrh.

Recently I have observed numerous cases which have led me to believe that no man should be assigned to submarine duty who has had syphilis or any of the complications of gonorrhea, such as orchitis, epididymitis and stricture. I have observed that men on submarine duty show an unusual tendency to the above named complications. A recent case is of sufficient interest to report. While one of the submarines of this flotilla was trimming down for a submerged run a member of the crew discovered he was unable to urinate. Previous to this he had suffered from frequent urination due to a cystitis, and not being able to void his urine his suffering became unbearable. He was able to void urine after repeated attempts to dilate the urethra by means of a lead pencil. A case recently discharged from a naval hospital with a diagnosis of syphilitic hemiplegia was assigned to duty on one of the submarines of this flotilla. In view of the fact that submarines are

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frequently absent from the tender for days at a time it is apparent that men who have suffered from syphilis of the nervous system should not be assigned to submarine duty.

To me it is becoming more and more apparent that all men should undergo a thorough physical and mental examination before being assigned to submarine duty. I am informed that this is done in at least two of the foreign services.

Fleet Surg. W. J. Colborne, of the British Navy, in an article, "Hints for Medical Officers of the Royal Navy," *Journal of the Royal Naval Medical Service*, July, 1916, says: "For such a service (submarines) it is necessary that the man should be physically and mentally of healthy type, for the life calls for endurance, and the conditions may be such that the minor ailments, of no consequence under ordinary circumstances, may become of serious import later on, not only to the individual but to the ship's complement of the submarine. Syphilis, whether there are any active signs or not, stricture, recurring epididymitis, as well as marked polyuria which is often of nervous origin, render the candidate unfit for the service."

I desire to take this opportunity of thanking F. L. Bevier, chief pharmacist's mate, U. S. Navy, and R. B. Clay, hospital apprentice, U. S. Navy, for their assistance in this work.

SUMMARY

1. The number of bacteria and moulds present in the air of submarines while running awash and submerged is probably less than in dwellings and battleships.

2. The amount of carbon dioxide present in the atmosphere of submarines and excessive heat while submerged are not as deleterious in their effects as the degree of humidity.

3. Long continuous service in submarines probably tends to increase blood pressure.

4. Inhalation of fumes of fuel oil may produce a mild form of albuminuria.

5. All men should undergo thorough physical examination before being assigned to submarine duty and no man should be accepted who has had syphilis, or any of the complications or sequela of gonorrhea.

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THE ADMINISTRATIVE TECHNIQUE OF ANTITYPHOID INOCULATIONS

By Major JOHN H. ALLEN

Medical Corps, United States Army

THE following is a simple and satisfactory method for inoculating a command in a minimum amount of time.

There is a marked variance in the methods used by medical officers in inoculating their commands with the antityphoid and paratyphoid serums.

I have had opportunities to observe many of them, and in some have been struck with the entire absence of any systematic procedure and often with the crudeness and barbarity of the methods occasionally employed.

The continued success of this most humanitarian work means much toward the attainment of our military efficiency, and never more than at the present time when hundreds of thousands of men will have to be rendered immune. Every medical officer should take pride in the wonderful results obtained in freeing our army from the dreadful plague of typhoid and endeavor in every possible way to keep up the good work.

This work can be done quickly, and with little or no disturbance to the routine duties of the command—or it can be made a very vexing ordeal, with the development of many unpleasant complications.

In order to inoculate a command promptly and efficiently, it is necessary for the medical officer to establish a systematic line of procedure and follow it faithfully. The plan herewith given was adopted by me at the maneuver division camp in San Antonio, in 1911. I have adhered to it ever since, with the most satisfactory results and often under most trying conditions in three years' field service in Texas. It is submitted in what may appear unnecessary detail; but each point is important for the success of the whole plan, which is exceedingly simple and applicable to either garrison or field work.

PRELIMINARY ARRANGEMENTS

The commanding officer should be requested to set a definite time and place when each unit will report to the medical officer and should personally see that they report as ordered. One of the chief difficulties encountered is in rounding up the absentees and stragglers, who will drift into the hospital at irregular intervals and at most inconvenient hours if they are not definitely ordered at fixed dates and hours.

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Attempts to arrange hours for inoculation with individual company commanders almost invariably have unsatisfactory sequences. The duty of seeing that all men report should devolve on the commanding officer and not be made a matter of personal convenience to those concerned.

In a regimental command it is preferable to have a battalion report in the morning and another in the afternoon, or if convenient, both in the forenoon. One battalion should be left free to perform the guard and necessary fatigue for the day of inoculation and the following day. Both cooks of a company should not be inoculated the same day, but every other man should be accounted for and finished with his organization. The men should be given notice that drills and fatigue will as far as possible, be omitted on the following day. The inoculation makes practically no difference to the great majority, who will go about their work as usual; but some few may be unfavorably affected and have a tendency to balk or try to evade the next inoculations. It is an excellent idea for the surgeon to prepare a concisely worded circular of information relative to this work. It should be posted on the bulletin boards several days before the time set for the operations and should explain in simple and easily understood language the benefits to be derived; give a comparison with former mortalities from typhoid, tell them what unpleasant symptoms are to be expected, lay emphasis upon the necessity of abstaining from alcohol and violent exercise and add any other information that may be pertinent to the subject.

The soldier is, after all, a reasoning creature. He gets many orders to do things for which he can see no earthly reason for doing, and it doesn't hurt to occasionally tell him some of the whys and wherefores. He will coöperate with his officers much more readily and willingly if he is given a chance to understand something about what is to be done.

The psychological factor is a very important one in this procedure. A few obstreperous and balky men can do much to hinder and delay the work. One or two at the head of the column may stampede the whole outfit and render the work very difficult.

If the company officers take their place in line and submit first, the effect is often apparent on the men. These are small items to mention, but all have their bearing upon results obtained.

The line should form at the entrance to the room or tent and continue in the same direction to the exit. In pleasant weather, even in garrison, I prefer the use of two conjoined hospital tents to the small rooms usually available in our post hospitals. There are no steps to walk up or down; there is less noise and confusion; the men do not injure the polished floors and litter up the building, and have no diffi-

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culty in going straight ahead and out. Great confusion results if they are allowed to double back and come in contact with the men entering.

The first sergeant brings a roster of the company in duplicate. He sits at the door with a copy of the roll while a sergeant of the Medical Department sits beside him. Together they check off the names and make notations for those absent. The date for the succeeding doses is indicated on the paper. Both rolls are compared. One goes to the company, the other remains at the hospital.

Each man rolls up his left sleeve to the shoulder and is touched in the proper place with iodine, by an assistant, before the line starts to move. I have found the most satisfactory point for inoculating to be on the extensor surface of the arm, about midway between the elbow and the point of insertion of the deltoid muscle. If made at the insertion of the muscle, as has been recommended, the point of tenderness is at exactly the wrong place, as it is at the attachment where the muscular strain comes in raising the arm. Care should be taken not to get the inoculation on the flexor surface, on account of the painful and sometimes serious axillary adenitis resulting. Large and fresh tattoos, large vaccination scars and sores or abrasions should be avoided by selection of the other arm. The same applies to points of inflammation remaining from a previous inoculation.

POSITION OF THE ARM

Each man in approaching the table places his hand on his hip. This brings his arm almost level, or at a very slight angle. This position is of the greatest importance for the rapid and easy execution of the work, for the reason that each arm reaches the operator on a line and at almost the same level. The operator does not have to turn or twist the man's arm or change his own position hardly at all. The inoculating surface is near his own eyes and not distant as when hanging by the man's side. The arm is fixed and steady, and gives an accurate and firm support to both hands of the surgeon, who grasps up a fold of skin with his left while his right with the syringe rests on the elbow. Another advantage is that the injection is given almost horizontally and not perpendicularly. The point of the needle is not driven deep into the subcutaneous flesh and muscle, but slips along under the skin, rendering the injection almost painless. Still another advantage from this position is that there is no danger of the heavy metal piston slipping back and admitting air to the barrel as so often happens when it is held perpendicularly.

The simple attention to the position of the arm actually saves over 25 per cent of time and an equal amount of fatigue in vaccinating a hundred men.

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APPARATUS AND FIXTURES

Have a table not less than 6 feet long covered with clean towels or a sheet. On this are placed a tray with four or five hypodermic syringes with a few extra needles, all of which have been previously sterilized by boiling. There should be an alcohol lamp, or if that is not available, a small tin can or box, or a bottle with a rag wick, which will do just as well. A medicine glass containing alcohol should be near the lamp, and a roller bandage saturated with alcohol nearby. Two or three syringes are kept in use at the same time.

The surgeon stands at the head of the table nearest the head of the column. Opposite him are three assistants. Assistant No. 1 fills the barrel of the syringe with about 1 c.c. of alcohol, and slowly ejects this in the alcohol flame. He withdraws the needle, ejects the alcohol that is left inside, and wipes the point quickly on the alcohol soaked bandage to remove any carbonized material that remains in the lumen of the needle, and to clean the point. He passes the sterilized instrument to the second man, who hands it to the third. No. 3 quickly fills the syringe to the desired point, from the serum contained in a clean medicine glass immediately in front of him, and then hands it to the surgeon. The No. 2 man is a useful coördinating link in the chain, but can be omitted if help is limited. The work moves along rapidly in an almost unhesitating circle of movement, with no lost motion whatever.

The flame heats the needle red hot in an instant, and as this is the only part of the instrument that touches both flesh and fluid, there can be no complaint of the efficacy of sterilization process. A single needle may be used for several hundred injections. There is much less danger of contamination in having the serum in an open glass than in having to insert it each time into the narrow lumen of the small necked ampule, often held by dirty and unsteady fingers. Another 25 per cent of time is saved by having the serum in the glass, and there is scarcely any wastage as the needle is held in or over the glass in graduating the amount to be used. The serum should not be taken directly off the ice and used. It should first be allowed to reach the room temperature, otherwise it is much more painful to the patient. Immediately after inoculation, each arm is touched with iodine by a man standing at the back of the surgeon. This method will appeal at once to the medical officer who has found it necessary to carry around with him a cumbersome stove, and has been accustomed to unscrew and screw on a separate needle for each injection. The metal syringe itself can be thoroughly sterilized by heating it in the flame, with the piston with leather plunger

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drawn back. All of this apparatus can be carried in the pocket and made instantly available anywhere. A little alcohol left in the syringe and injected does no harm to the subject, and does not vitiate the effects of the serum, which is already preserved with an antiseptic.

With this work systematized as outlined above, it is easily possible for a single operator to inoculate 250 men an hour. An entire regiment may be inoculated by one man in a forenoon. I have personally given over 15,000 doses in this manner, and have had nothing but satisfactory results in every way.

The simplicity and rapidity with which this work can be done should appeal especially to the medical officers who have had occasion to officiate at the exercises incident to the mobilization of our National Guard during the past few months, and can therefore appreciate anything that savors of system and expedites the satisfactory completion of this important work.

NOTICE

The attention of the Medical Reserve Officers ordered to camps of instruction is particularly invited to the circular recently issued by the Surgeon General of the Army, specifying the articles with which each officer *must provide himself and bring to the camp with him.* There should be no misunderstanding about this; the articles enumerated are necessary to the officer's personal efficiency and comfort. *If he does not bring them, he will probably have to go without and will have nobody to blame but himself.* A word to the wise!

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EDITORIAL

PATRIOTISM AND DOLLARS

With the calling to active duty as medical officers, of large numbers of patriotic practitioners of medicine now in private life, an acute and grave economic question arises which is of the greatest importance, not only to them but to the profession at large.

These men, whom motives of pure patriotism have induced to volunteer their services to the country in its hour of military need, will be abruptly separated from their practices in civil life, which have been built up by years of labor and by demonstrated professional efficiency and high repute.

Many of them, on entering upon their military service, will receive pay and emoluments financially far less than their present income in civil life. In many instances they will have families to support and offices which they will desire to retain.

The war then will mean to such a very considerable financial sacrifice, and deprivation in many ways to their dependents. It will call upon many physicians to make good the difference between the necessary expenses of their dependents and their army pay, from their private resources. This in a way, and within reasonable limits, is one of the sacrifices which as good citizens they should make for their country. Other professional men, as lawyers, architects, engineers, etc., will be called upon to do the same.

But the professions are under a serious handicap in this respect as compared with the commercial branches of civil life. The doctor, for example, has invested his capital in mental training and mental development which he alone has the power to transmute into financial returns and the comforts of life. If the exercise of this mental development is brought into abeyance, or if it be financially rewarded to a less degree, no part of the capitalized education temporarily directed to military purposes can be employed to the advantage of the income of the individual.

The reverse is true of officers who enter the military service from capitalized commercial pursuits. Here their money has been invested in real property or commodities, and this capital can be turned into money or managed by others so as still to afford an income to supplement the army pay. A business partner, a relative, or a hired agent may conduct the business. A line officer from commercial life may, therefore, with his army pay in addition to his business income, be better off financially after he enters the military service than he was before.

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The sacrifices which the professions are called upon to make for the privilege of rendering patriotic service are, therefore, greater than those demanded of the commercial classes of similar social status in civil life. This is inevitable, but it may be mitigated.

Also the doctors who enter the service feel that their practices may be absorbed by their competitors who remain behind in civil life, while they themselves risk their lives at the front; and they are naturally apprehensive lest, on returning home after the war, they will find their practices dissipated and lost. This, to many, is a very cogent argument against giving their services to the Government and one in which all must recognize the existence of a certain degree of justice. It ought not to be impossible for the profession to remove, at least, a part of its force by coöperative action, rather than allow it to remain exposed to competitive danger.

The coöperation suggested becomes far more practicable and necessary as a result of the compulsory service law, which renders all doctors —and not volunteers alone—within certain limits of age and physical efficiency, liable to give the nation military service at call. If not enough doctors offer their services to meet the needs of the Government, enough others to make up the deficiency will surely be drafted. If the present war in which we are engaged lasts any length of time, the probabilities become almost a certainty that such draft will be extensive. No one can foretell where the lot may fall. He who profits now from the practices left by those who have volunteered, may soon himself be called to the colors. Coöperative action is necessary by the profession, for neither the patriotic offer of the volunteer nor the obligation of the drafted to perform service should be allowed to be capitalized to the profit of those of the profession who, for one reason or another, may remain at home. Medical men by many thousands will be affected.

The problem is too great and too widely spread to remain without attempt at solution by the profession at large. This attempt should be inaugurated without delay through the various medical societies and the American Medical Association.

The following general action is suggested:

(*a*) That medical societies shall, by formal resolution, declare that their members absent on military duty are on the same status as if on vacation or other absence.

(*b*) That they shall so declare themselves, in cases where such action is requested by a member about to leave for service, as the custodians and guardians of his practice while so absent.

(*c*) That they shall examine the books of such departing member and

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shall list as part of his clientele, all persons or families to which he has rendered professional treatment within two years.

(*d*) That they shall in such instances, and so far as practicable, direct and designate certain of their members who are to stay at home, to take over all or any part of the professional work which may develop from this clientele. In this way, also, the interests of the prospective patients will be safeguarded by the reputable and qualified.

(*e*) That they shall require from each member so remaining and designated as a *locum tenens* a written agreement that from any funds received from the listed clientele of the absent medical officer during his absence, 40 per cent shall be banked to the credit of the latter through a representative of the society, while 60 per cent may be retained by the physician performing the professional service.

(*f*) That when the medical officer returns from the war to his private practice his clientele will, so far as the society can bring it about, be returned to him by those who have given it professional service during his absence with the colors.

(*g*) That any physician who has thus been designated by the society as a *locum tenens* and who fails to live up to his agreement therewith, shall be disciplined by the society—not excluding expulsion from membership.

By some arrangement like this, the physician who puts on the uniform, he who remains behind, the profession at large, the welfare of the patient, and the interest of the nation will all be equally safeguarded.

E. L. M.

FIRST AT THE FRONT

Already the newspapers are carrying items about this or that organization, or branch of the service, which it is expected will have the distinction of being first to serve in France.

We should like to remind the gentlemen of the press that this question is one which is already settled. While others have been talking and preparing, the Medical Corps of the Army has been *doing*, as a result of previous preparation,

It had numerous representatives abroad as official observers and on leave before the declaration of war by this country.

It took over the management of certain hospitals in France when war was declared.

It has since sent over large numbers of medical personnel, not only for service as individuals but as part of numerous sanitary formations, organized as required for the military forces of the United States, of which they are an official part.

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Its representatives have for some time been at the front in large numbers—and they will be there in much larger numbers before any other branch of the service sets official foot on the continent of Europe.

The work and efficiency of the Medical Department is too often overlooked or disregarded. We propose to establish the fact beyond question, and once for all, that in this war it was the Medical Department which was "first at the front."

E. L. M.

WHAT ARE YOU DOING TO HELP?

You who read this page are in all probability medical officers of the services, regular or reserve or militia.

You are prepared to do your duty, as a citizen, patriot and humanitarian. Whatever befalls, you can be relied upon to give the best that is in you. If you are not already under orders, you are awaiting them. And they will not long be deferred.

But more is required of you than your personal service in the military establishment. There are not enough of you to wear the uniform. The Army Medical Department urgently needs more officers. It needs them not by hundreds but literally by many thousands. And it needs them at once.

Recent military legislation requires the immediate creation of a land force of about 1,200,000 men. It provides for a further addition of over 600,000 men. Those who are best informed are convinced that the creation of this entire force of nearly 2,000,000 men, including non-combatants and attached civilians, will be necessary without delay.

The proportion of medical officers to the rest of the Army, in time of peace, is fixed by law at 7 per 1,000 In time of war, at least 10 per 1,000 are imperatively demanded, with a further reserve to meet wastage, emergency and the multifarious duties of home service. You can figure for yourselves how many thousands of doctors the land forces of the United States not only ought to have but must have.

Perhaps the most valuable service you can render to your country is to rally all the medical men you can to care for those who help protect the flag. By society meetings, by direct interview, and in other ways you can induce others to answer the call which you have heeded. You should at once exert every possible effort to this end.

Under the recent legislation mentioned, all citizens over twenty and less than thirty-one years of age may be drafted for service. These age limits include those of the average recent medical graduate, the hospital interne, and the physician not yet well established in practice. The medical profession is not in any way exempt from the general

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provisions of the draft. If a sufficient number of the above class fails to volunteer, the remainder will be taken.

The combination of opportunity to young men to serve their country, acquire the broadest kind of professional experience, and receive good pay ought to appeal to the red-blooded and ambitious. As to the other type, it might consider it an advantage to be a "went" now than a "sent" later.

For the older medical men, places can be found commensurate with their professional standing, years and experience. They too are needed —and needed in great numbers. The need and obligation should be brought home to them as individuals.

If each medical officer now enrolled would bring in even a single recruit to the Army Medical Corps, it would go a long way to meeting the necessity of the care of the sick and wounded. The nation desires and expects your help in this most vital humanitarian matter.

The emergency is urgent—the need great! E. L. M.

MENTAL RESERVATION

It could hardly be expected that physicians, called from their peaceful pursuits to the new and unfamiliar duties of medical officers, would at once grasp the full significance of the elementary lesson of the soldier —unquestioning obedience. Examiners are constantly questioned as to the period, place and nature of the service to which applicants may be ordered. Usually the candidate has his own views as to where and when he would prefer to serve and the duty which he can best perform. Even when he accepts his commission (which he almost invariably thinks should be in a higher rank) it is too often with an expressed, or implied, mental reservation, that does not promise well for his future usefulness.

The time for hesitation has passed. We are all in the same business, and it is a serious one. Lieutenants, captains, or majors—we all have our spurs yet to win, and the vital question is, *not* what rank the individual holds, but whether he will be able to *fill* it. If any raw major flatters himself that his new distinction carries with it corresponding experience, he will soon be undeceived when he reaches the training camp, or is later placed in a position of responsibility.

We have always opposed promotion in the Medical Reserve Corps, except as the reward for actual service, but, since we have won the reward first, it is up to us to *deserve* it. A great opportunity has been offered to the Corps to test its true value, and we can give nothing less than absolute and whole-hearted devotion to the Medical Department, to which we have pledged our loyalty.

H. C. Coe.

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PROMOTION OF RESERVISTS CALLED TO ACTIVE DUTY

Doubtless many of the officers of the Medical Reserve Corps on active duty at the time war was declared have been surprised and disappointed at not seeing their names included in the lists of reserve medical officers given higher rank.

This omission is not due to failure to recognize their qualifications for such rank, but to rulings which prevent it until ninety days have elapsed since war was declared. It was found that they could not be so promoted without relieving them from active duty, which was undesirable from the standpoint of every interest concerned.

THE MILITARY SURGEON desires to assure these officers that the authorities have every intention to recognize their faithful service and military experience. They fully appreciate, moreover, that it is to the interest of the Government to place them in positions of higher executive duty. As soon as opportunity permits, the action will be taken which all desire, and recognize as not only just to the individual but for the interests of the service.

E. L. M.

NON-COMBATANTS?

THE MILITARY SURGEON is informed by unimpeachable authority that in the forces of one of our allies abroad, the percentage of battle losses in the medical corps for the war, up to the present time, in killed and wounded, is greater than that for any other branch of the service, not excepting the infantry.

In a certain battle, on a 5-mile front and during two consecutive days, no less than 257 medical officers were killed and wounded.

And yet in the public mind the personnel of the medical service is pictured as "non-combatants" who are, by duty, distance, environment and the Geneva Convention, spared the dangers and vicissitudes of war.

"In the House of Lords recently," says *The Lancet*, "when the military service (review of exceptions) bill was read a third time and passed, Lord Derby said it was impossible to set up medical appeal boards all over the country, as was asked for in the House of Commons, because there were not sufficient doctors to do the work. Some people, he said, thought that the work of the Royal Army Medical Corps was free from danger, but, as a matter of fact, the army lost more than 400 doctors, killed and wounded, in the Somme battle alone. At the present moment, he added, the army was not critically, but certainly lamentably, short of doctors."

E. L. M.

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OFF FOR THE FRONT

Our first military force is on the ocean and every medical officer must envy Maj. Harry Gilchrist, M. C., U. S. Army, who commands the fine fellows who comprise Major Crile's Base Hospital Unit. As we listened to the parting message of General Gorgas to the brave men and women who have gone to seek perhaps "The Great Adventure," we who were left behind felt our hearts thrill with pride in the Medical Reserve Corps which has offered its best to the service.

No emotional outburst attended this departure. It was calm, soldierly and business-like.

Other units will follow soon, and before long there will be a steady stream of reserve medical officers, to carry much-needed help to our brothers abroad.

We are not at liberty to go into details, but we may state that the profession is responding to the call to duty and will not hesitate when ordered to foreign service.

It is especially gratifying to note the willingness of the younger members to go to the front. But it is not confined to them. Old and young—all have heard the call and are casting aside doubt and self-interest. We may not all have this high privilege; the older men, "who only stand and wait," will find their place, though they look with longing eyes to the fields of France.

The signal is set: "America expects every man to do his duty."

H. C. Coe.

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COMMENT AND CRITICISM

CAMPS OF INSTRUCTION FOR MEDICAL OFFICERS

As foreshadowed in THE MILITARY SURGEON, four training camps for the instruction of recently appointed members of the Medical Officers' Reserve Corps, and Medical Corps of the Militia, will probably be organized and functioning before our June issue will reach the membership. We take it, however, that what we have to say upon the subject, even in these rapidly moving days, will not be regarded as ancient history.

It goes quite as much without saying, that the civilian medical man as the civilian business man, equally need training before such can become efficient officers in the respective branches of the military service to which they will be assigned. So, following the Plattsburg idea, training camps for medical officers are being established at Fort Benjamin Harrison, Ind., Fort Riley, Kans., Fort Oglethorpe, Ga., and Leon Springs, Tex., in connection with the camps for other officers. The underlying motive, of course, is to rapidly and intensively train the several thousand newly commissioned medical officers in their military duties, and the several thousand more who will follow them, so that they, in addition to numerous other things, of which they now know nothing, will be able in turn to train the scores of thousands of sanitary officers and soldiers who will serve under their command.

We often hear the cry, "Send us a trained noncommissioned officer of the Medical Department to look after our paper work and property." Whose duty it is to train him and how it is done probably does not occur to the cryer, but if he stops to think, he must realize that the sergeant is the product of the training by medical officers, exactly as is the case in other branches of the service. Such training cannot be imparted by those who are not themselves trained, and yet if it is not imparted there will be no noncommissioned officers of value, no disciplined sanitary troops, and the administration of the medical department will break down.

The task the medical officers of the regular army must now undertake in this connection, besides numberless other demands on their time and strength, will be the organization and administration of schools with students more numerous than the combined student bodies of Yale and Princeton, while the faculty will be numerically far smaller. The problem is a stupendous one and in its solution the medical department is entitled to the sympathy and moral support

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of the entire profession. Let no civil physician deceive himself with the idea that the acceptance of a commission and the donning of a uniform constitute him a medical officer. They are but the outward signs of such.

The object of the proposed training is to supply the knowledge which will enable the new officer not alone to work under the direction of more experienced officers, for we have not a sufficient number of such, even to direct, but to perform their duties independently; to, in their turn, supervise others and transmit their knowledge to their subordinates, both commissioned and enlisted. There is an ancient service adage to the effect that good officers can always make good soldiers. The converse of this does not hold true. So we must start with good officers if we are to be efficient.

As all our officers necessarily have the essential medical foundation and are professionally competent, no instruction need be given in purely professional matters. Moreover, the training must be practical, and only so much theoretical instruction given as is necessary to elucidate the subject. There will, of course, be lectures on special subjects, map problems, war games, demonstrations, etc.

It will not be practicable to send all of the newly commissioned medical officers to the designated camps of instruction; not a few of them must at once be assigned to service with troops, who will require their professional services, irrespective of their lack of knowledge of the military environment. The training of such officers will have to be systematically done under the supervision of the responsible medical officer of the command, who, doubtless, will almost always be a trained man. Such training must be carefully supervised, as there is always a tendency to subordinate it to existing duties. Both must receive a due measure of attention.

The following is an approximately accurate outline of what will be done in the training camps.

The course is intended to give the student officers a general idea of the basic duties of a medical officer and prepare them for service with troops in the field. Training will be intensive and pushed as rapidly as possible. It will be borne in mind that the services of thousands of instructed medical officers must be available at an early date.

The training to be given is intended to prepare these officers to conduct the service of the Medical Department without either the supervision of experienced medical officers or the aid of well-qualified noncommissioned officers. The limited number of these two classes in the Medical Department, and the necessity of assigning many of them to important administrative duties, renders it probable that few

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will be available for regimental duty, and only a small number with ambulance companies and field hospitals.

For this reason, also, upon the reserve and militia medical officers, graduated from these training camps, will fall the duty of themselves drilling and training the very many thousands of enlisted raw recruits which will be assigned to the Medical Department, and they must be put into a condition to carry out this most important work effectively.

It is expected that each camp shall have accommodations for 600 medical officers. They will be organized into companies, duly officered, commissioned and noncommissioned, to be selected from among the student officers and trained on a basis of medical cadets. It is desired to impress upon these new officers, by actual experience, what will later be required by them of their subordinates.

The staff of the Commandant, a medical officer, will be composed of an Assistant Commandant, an Adjutant and a Quartermaster, all of whom will be instructors in addition to their other duties. It is proposed, if possible, to assign additional instructors on the basis of one to each fifty student officers. Due to the shortage of regular officers, specially qualified militia medical officers may be assigned to such duty. Officers with regimental detachments, ambulance companies and field hospitals will, in addition to their duties as such, serve as instructors, due effort being made to assign to each subject, officers known to have given special attention thereto and to possess ability to impart information and student officers found specially qualified in any subject may be assigned as instructors and given special authority while so serving, irrespective of rank.

The assistance of the line officer instructors at line camps in teaching map reading, special lectures and the tactical part of medico-military problems and maneuvers may be requested.

Instruction by lectures, except in special subjects, will, as far as possible, give place to recitations. Lectures are not considered as effective as recitations in imparting detailed information, nor do they afford opportunity to test the capacity of and grade the student.

Lessons will, therefore, be assigned in the authorized text-books, and quizzes held thereon, for the purpose of grounding students in theory and insuring that a competent knowledge of methods and principles has been acquired. But coincident with this theoretical instruction, the student officers should, as far as possible, be made to visualize the organizations, apparatus and methods concerned. In addition to study and lectures, it is most important that they should learn by seeing and doing. So far as possible, instruction will be made practical. To this end, for example, all sanitary appliances and methods likely to be of

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use in field work will be procured or constructed and continually kept in effective operation at the camp, and the officers will be shown their purpose and practical use. Bomb proofs for trench warfare will be thrown up, and gas chambers for practical trial of protection against poison gases will be constructed.

In connection with paper work, all papers required by the medical and other departments will be actually made out until familiarity therewith, and correctness of result, is secured.

Mess management, taught in theory, will be actually demonstrated in the organization kitchens. Applied camp sanitation will be taught by sanitary inspectors. Drill will be taught until every officer can effectively handle and instruct therein the units and detachments of the Medical Department.

The interior economy and administration of regimental detachments, ambulance companies and field hospitals will be taught not only by books but by assignment to such organizations and quartering and subsistence therewith, and by actually handling them in marches and comprehensive field problems. To permit of the latter it is expected that 4 ambulance companies, 4 field hospitals, and 6 regimental sanitary detachments, all complete and kept recruited up to war strength will be organized without delay. The regimental detachments will be organized as two provisional companies, to be split into their integral regimental parts for demonstration purposes.

Student officers will be assigned to duty with regimental detachments, ambulance companies and field hospitals as junior officers and supernumeraries, to familiarize them with these organizations, the handling of men, etc. Officers so assigned should be quartered and messed with these organizations, but will pursue the regular curriculum of training at the camp. Assignments should be made in rotation, and ordinarily for ten days with each organization.

The training course will be divided into three periods, of one month each. The first, while instructing the officer as such, is intended especially to familiarize him with the duties of his enlisted subordinates whom he must shortly train. The second takes up his training in his own special functions as an officer. The third carries on and completes the work of the second period.

New training classes should as far as possible be started at the conclusion of each month's training period. However, to meet immediate needs, officers needing training will be sent to camps at any time and will be organized at once into groups for instruction.

The following text-books are authorized for the course of instruction: Army Regulations; Manual of the Medical Department; Field

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Service Regulations; Drill Regulations for Sanitary Troops; Manual of Courts Martial. Such other school text-books as may be authorized will be announced later.

The daily instruction, except Saturday afternoon and Sunday, should approximate 7½ hours daily. The following general scheme is suggested for the daily schedule for the first month:

6		A. M.	Reveille.
6.15–	6.30	A. M.	Setting up.
6.35–	7.25	A. M.	Breakfast. Police of quarters.
7.30–	8.25	A. M.	Drill (marching?).
8.30–	9.25	A. M.	Drill (special?).
9.30–	10.25	A. M.	Quiz or lecture.
10.30–	11.25	A. M.	Quiz or lecture.
11.30–	12.55	P. M.	Dinner, rest, etc.
1.00–	1.55	P. M.	Quiz or lecture.
2.00–	2.55	P. M.	Quiz or lecture.
3.00–	4.25	P. M.	Equitation.
4.30–	5.55	P. M.	Care of animals, supper, rest, etc.
6		P. M.	Retreat.

On this general plan, 180 hours of formal instruction will be given monthly. No evening exercises are contemplated. Time will be needed for study. Saturday afternoon to be a rest period. Officers to be encouraged in equitation on Sunday, preferably in form of tactical ride. The schedule for the third month will vary materially from above, due to the practical field sanitary problems contemplated, and the fact that at least one full half day is ordinarily needed for each. This provides for a total course of 580 hours of instruction.

The following will indicate the proposed scope and distribution of training of medical officers during the first period of one month of thirty days:

Setting up (15 minutes daily for 26 days)	6.5 hours
Drills (marching, litter, ambulance, other means of transport,)	52 hours
Inspections	4 hours
Equitation, bridling, saddling, care of animals, etc	33 hours
Tent pitching, shelter tent	2 hours
Tent pitching, pyramidal tent	2 hours
Personal equipment of the sanitary soldier	1 hour
Field and surplus kits	1 hour
Care and maintenance of soldier's equipment	2 hours
First aid, using soldier's equipment only	2 hours
Examination of recruits, with papers and finger prints	8 hours
Nature and employment of regimental medical supplies	8 hours
Customs of the service	2 hours

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Duties of the soldier	4	hours
Regulation of Medical Department to rest of Army	1	hour
General Organization of Medical Department for war	4	hours
Army Regulations	12	hours
General organization of military forces	2	hours
Manual for the Medical Department	12	hours
Military hygiene and sanitation	6	hours
Filed Service Regulations	6	hours
Paper work, relating to the Medical Department	4	hours
Map reading, use of compass, orientation, etc	6	hours
	180	hours

The following scheme shows the scope and distribution of training of medical officers during the second period of one month of thirty days:

Setting up (15 minutes daily for 26 days)	6.5	hours
Drills, marching	26	hours
Inspections	4	hours
Equitation and care of animals	33	hours
Tent pitching, hospital tentage	4	hours
Elementary road sketching	4	hours
The regimental detachment; its use and internal administration	8	hours
The ambulance company; its equipment, use and internal administration	8	hours
The field hospital; its equipment, use and internal administration	8	hours
The tactical use of infantry (lecture by line officer)	1	hour
The tactical use of cavalry (lecture by line officer)	1	hour
The tactical use of field artillery (lecture by line officer)	1	hour
The use of the Engineer and Signal Corps (lecture by line officer)	1	hour
The service and mechanism of supply in the field (lecture by Quartermaster)	1	hour
Paper work, relating to the Medical Department	12	hours
Paper work relating to the Quartermaster's Department	4	hours
Paper work, relating to the Ordnance Department	2	hours
The Medical Department in campaign	8	hours
The principles of sanitary tactics	8	hours
Map problems	4	hours
War games	8	hours
Military hygiene and sanitation	12	hours
Army Regulations	6	hours
Manual for the Medical Department	6	hours
Lectures on special subjects	6	hours
Total	180	hours

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The following scheme shows the scope and distribution of training of medical officers during the third period of one month of thirty days:

Setting up (15 minutes daily for 26 days)	6.5	hours
Drills (service as drill master in drills of diverse nature)	26	hours
Inspections	4	hours
Equitation	15	hours
Handling of rations and mess management	2	hours
Manual for Court Martial and military law	8	hours
The Articles of War	1	hour
The Geneva and Hague Conventions	1	hour
The rules of land warfare	1	hour
Military surgery	8	hours
Poison gases, protection against, symptoms and treatment (demonstrations)	1	hour
Liquid fire, shell shock	1	hour
War psychoses and neuroses	2	hours
Malingering	1	hour
Trench warfare; "trench foot"	1	hour
Demonstration of trench system, including bomb proofs, dug-outs, entanglements, abattis, etc.	1	hour
Cantonment hospitals, organization and management of	2	hours
The sanitary service, line of communications	1	hour
Hospital ships, ships for patients, hospital trains, trains for patients	2	hours
Base hospitals, their organization and management	1	hour
General hospitals, their organization and management	1	hour
Contagious disease hospitals, casual camps, convalescent camps, camps for prisoners of war	1	hour
Organization, functions and limitations of the American Red Cross	1	hour
The civil sanitary function of the Army Medical Department in occupied territory	1	hour
War games	2	hours
Tactical rides	6	hours
Sanitary inspections, practical demonstration of methods of	4	hours
Practical march and bivouac (2 days)	15	hours
Practical field maneuvers, including brigade and divisional problems, with two night problems, and utilizing regimental detachments, ambulance companies, field hospitals, stations for slightly wounded, etc., in coordination. Problems will include the attack, retreat, planned defense and reencounter with all arms	60	hours
Lectures on special subjects	4	hours
Total	180	hours

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NOTE.—For the proper conducting of the large medical maneuvers contemplated during this period, the services of a company or battalion of the Signal Corps are desirable. The duties assigned to them, however, are such as pertain to their normal functions and training. When line troops are available, the above problems should be carried out with them, as part of their training as well as that of the sanitary personnel.

Dental surgeons and veterinary surgeons will be required to take the general course for medical officers, with the exception of the subjects which pertain more or less exclusively to the work of medical officers as such and with the substitution therefor of subjects directly relating to the dental or veterinary service. Pending instructions from this office, you will arrange tentatively for this special instruction.

To stimulate student officers to their best work a certain number of places in the grade of captain and major, Medical Department Officers' Reserve Corps, will be left unfilled. Appointment will be made to these vacancies from among the student medical officers, who, on vote of the staff of instructors, are recommended by the commandant as possessing such exceptional knowledge, aptitude and efficiency as would qualify them for such increased rank.

To this end there will be established and maintained a grading system of marking, by which relative efficiency will be recorded.

Also medical officers satisfying the age and other requirements and after passing such examination as the Surgeon General may require, may, subject to the vote of the staff of instructors, and approval of the commandant, be commissioned at once as first lieutenants in the Medical Corps of the Army. If any reserve officer is found unfit for the service by reason of physical, mental, moral or temperamental reasons, he will, on vote of the staff of instructors, be recommended for separation from the service.

The foregoing indicates that the Surgeon General of the Army has prepared a very comprehensive scheme of instruction, which if carried out as he intends it should be, will furnish him a corps of officers well informed in the essentials of their duties and needing only the practical experience, which will quickly come, to make them, and consequently the Medical Department, thoroughly efficient.

While it is not expected that the proposed course will produce the thoroughly trained medical officer, it will certainly furnish an opportunity to acquire a practical knowledge of the fundamentals of his specialty, upon which he can build efficiently.

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THE EMERGENCY RATION

There is some question whether an emergency ration is needed in our service. At least the Infantry Equipment Board recommended in 1912 that it be discontinued. It may be assumed that the board took this action because the haversack ration, consisting for the most part of hard-tack and bacon, is to all intents and purposes an emergency ration, and it is difficult to imagine tactical situations where the issue of the haversack ration would be impossible.

But the recommendation of this board was not followed and the Army is still experimenting with a so-called emergency ration prepared on the principle of the dog biscuit. Moreover, there seems to be a very reasonable doubt in the minds of the authorities as to the proper preservation of the various emergency rations heretofore adopted, because at regular intervals samples are sent to the laboratories with requests for bacteriological examination of these comestibles. An emergency ration that will not keep, but must be continually subject to examination, is open to serious objection.

What are the prime requisites of a satisfactory emergency ration? It is believed that they may be stated about as follows:

1. It should be a reasonably balanced ration, and should furnish sufficient food value and energy to maintain a soldier in his accustomed activities for a short period.
2. It must be palatable.
3. Bulk and weight should be reduced to the minimum consistent with the above.
4. Its ingredients should be capable of indefinite preservation without deterioration.
5. It must be cheap and readily purchasable in large quantities.

The writer would suggest that hard-tack and sweet chocolate fulfill all of these requirements better than any emergency ration we have yet had. It will probably be admitted, without further argument, that these ingredients are cheap and readily purchasable in large quantities, and that, properly packed in tins, they may be kept for years without deterioration. They are also palatable. Sweet chocolate is a delicacy, and while we may not enjoy hard-tack as a luxury, no soldier will claim that it is unpalatable or would raise any objection to it under circumstances calling for the emergency ration. It will possibly always form the bulk of the diet of the soldier during active campaigning. The bulk and weight are as small as can be reasonably expected in view of the number of calories furnished.

As an illustration, let us assume a ration of 10 ounces hard-tack and

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6 ounces sweet chocolate. The food value of this ration would be approximately as follows:

	Proteid		Fat		Carbohydrate		Total	
	Grams	Calories	Grams	Calories	Grams	Calories	Grams	Calories
10 oz. hard-tack..	36	147	9	83	255	1,045	300	1,275
6 oz. chocolate....	8.5	35	39.6	368	102.6	420	150	823
Total.....	44.5	182	48.6	451	357.6	1,465	480[1]	2,098

[1] Thirty grams extractives and other matter not included in this analysis.

Let us compare the food value of this ration with that of other rations and with established dietary standards:

Ration	Proteid		Fat		Carbohydrate		Total	
	Grams	Calories	Grams	Calories	Grams	Calories	Grams	Calories
Voit.....	118	483.8	56	520	500	2,050	674	3,033
Chittenden.....	60	246	60	558	500	2,050	620	2,854
Haversack.....	113	463	218	2,027	489	2,004	820	4,494
Old emergency 8 oz. chocolate mixture.....	60.5	248	67.3	624.8	93.8	384.5	240	1,272
Proposed emergency.....	44.5	182	48.6	451	357.6	1,465	480	2,097

Calorimetric studies have shown that a man at absolute rest in bed expends from 1,600 to 1,800 calories per diem, and that this may be regarded as the minimum basal requirement. The amount of food beyond this that will be required to maintain normal metabolism will depend upon the amount of work to be performed.

We see by a glance at the above table that the old emergency ration would not have supplied the minimum basal requirement of a man spending the entire day in bed, and that this deficiency was due to the great shortage in carbohydrates in this ration. In an emergency such a ration would be a little better than nothing at all, and that is all that can be said for it.

We also see the high fuel value of the haversack ration, presumably supplied because the soldier must perform hard work in marching, digging trenches, etc. Is it not probable that the soldier who must live on the emergency ration will also have to perform hard work?

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We should, therefore, make the emergency ration just as liberal as is consistent with its emergency character. It must at the very least provide a "living wage," so to speak. The old emergency ration did not furnish this, and the proposed ration of 10 ounces hard-tack and 6 ounces sweet chocolate does furnish nearly 300 calories in excess of the minimum basal requirement. No one will claim that this is excessive for any man who must work. Some may question whether it is sufficient. I believe it is sufficient for short periods and the emergency ration is not supposed to be needed for long periods.

The proposed ration weighs a pound. This is an increase in weight over the old ration. I do not believe that it is possible to compress a food value on which a man can exist into a much smaller compass or weight.

Such a ration could be wrapped in three packages, one for each meal, and the whole placed in a hermetically sealed tin. It is believed that this ration will keep indefinitely when properly packed. The attention of those interested is respectfully invited to this simple solution of the problem of the emergency ration.

EDWARD B. VEDDER.

PURCHASING MILITARY SUPPLIES

Under editorial notes and comments in the *New York Medical Journal*, March 31, 1917, some very sane and pertinent suggestions are made upon the subject of purchasing army medical supplies in vast quantities in peace times for the exigency of war and for replenishing stock as reserve supplies become exhausted under stress of actual hostilities.

The tone of the editorial note seems to imply that the medical supply officers of the Army are at present in a dilemma, and if such be the case it is necessary in the reviewer's opinion first of all to gain time. The element of time is "the greatest of all advantages." If we can curtail the time required "in getting out specifications, issuing instructions, advertising for bids and making awards," it will be so much time gained for the contractor in filling of orders.

The plan outlined in the editorial, which bespeaks our unqualified indorsement, is as follows:

"Let the authorities take a census of the manufacturers of military medical material, noting the special lines which they manufacture and their capacity. Divide the requirements for armies of 250,000, 500,000, 1,000,000, and 2,000,000, among all the manufacturers proportionately. Furnish each manufacturer with a complete schedule of the articles

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which he would be asked to supply with full instructions as to packing, shipment, and point of delivery. Provide each manufacturer with a secret code, and on receipt of the appropriate code word he would immediately begin the manufacture and delivery in the shortest possible time of the quota of goods allotted to him for an army of a quarter of a million, a half million, or a million as the case might be. Let contracts with the manufacturer be contingent contracts under which he would agree to furnish the goods required in the shortest possible time, after receipt of a definite order, at a price to be made up of the actual cost of production, plus a specified profit."

If Congress will authorize the purchase of a year's reserve supplies for an army four times the actual strength of our present or immediately prospective Army, conformably to the recommendations of the Dodge Commission, this immense quantity could be contracted for without a contingency clause in the contract, and contingent contracts would be necessary only for replenishment of reserve supplies as they become exhausted under stress of war.

If contingent contracts were made as suggested and a liberal reserve were carried in stock in supply depots at all times, confusion would be avoided in emergency and any situation that might arise could be promptly and satisfactorily met. The reserve could be drawn upon after the contractor was notified of the call for supplies and an appreciable duration of time could be allowed the contractor to accumulate reserve supplies of crude materials.

A possible objection to a year's reserve supply for an army four times its actual strength is seen in the not infrequent changes in the supply tables of the Manual for the Medical Department deemed necessary in the interests of progress, and such changes might become less frequent and radical were the functions of medical supply more nearly correlated with those of the Quartermaster Department in the matter of a more highly specialized and constant personnel. But even as the case lies, the objection can be overcome, as in the past, by the extra time, labor and cost of extracting parts of units and replacing same by articles of newer invention or device.

Equally important to securing supplies quickly in an emergency, is the providing of adequate storage space for such supplies when furnished. Adequate storage space in normal times is oftentimes a crying need. Sufficient space should be provided in reserve for prompt storage of those supplies coming in under an emergency call, without cluttering up the avenues of outgoing supplies. This storage space could be provided by the erection of concrete warehouses on government owned land, of size sufficient for normal needs with a reserve of room for emergency

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needs. Sufficiently commodious warehouses will obviate the confusion and delay incident to the intake and output of supplies on an emergency order, and provision for these "end facilities" must go on hand in hand with the provision of the supplies themselves.

Regarding supplies THE MILITARY SURGEON is quoted as saying that there is now practically nothing on hand and that even were the money available it would take nearly a year to obtain the material.

The comments of the New York editor, now under review, afford some pertinent suggestions on how to gain time, and it was a dictum of Napoleon's that: "In order to escape from a dilemma it first of all is necessary to gain TIME."

HENRY I. RAYMOND.

JOINING THE COLORS

Ten thousand physicians attuned to the ways of peace, educated to individual thinking and that thought directed towards a single patient, accustomed to follow their own inclinations, are about to enter a new sphere of activity in which many preconceived ideas will be dissipated. Chief among these is one recently enunciated by a well-known civil surgeon, who wrote "that the surgeons who give their skill for the comfort of the sick soldiers go to their task as surgeons—nothing more, nothing less." This might be so, perhaps, if medical officers had only surgery to do, but such is quite contrary to the fact, for in a military community the life is that of "camps, troops and reports, as well as the etiquette of the salute and the thousand and one petty relics of military tradition." These are the customs of the profession of arms, and the medical officer, notwithstanding what the civil surgeon says to the contrary, plays an important rôle therein in the interest of the service.

One of the greatest advances in the art of war, in recognition of the intrinsic value of the trained soldier-man, is the effort now being made most successfully to protect him from all preventable inefficiency, and to prepare and preserve him for the supreme effort for which he exists —to meet and defeat the enemy. In this effort medical science and the medical officer are among the largest factors.

To be sure this is dimly understood by the civil community and reluctantly admitted by those of little vision in the military, but this attitude is slowly changing.

Harking back to the early days of the Association, we find in an admirable article on "Medical Field Service," by the late Col. Dallas Bache, M. C., U. S. Army,[1] the following quotation from an experienced

[1] Proceedings Association Military Surgeons, U. S., Vol. 5, page 385.

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medical officer of the British service of that period, which is particularly applicable to our present situation. Speaking hopefully and prophetically of a time when his own medical service would be more fully organized and his own medical corps coherent, as it actually is at this moment, he said: "That day is coming, and let us hope rapidly; but it can only come when the medical service fully appreciates its rôle and remembers that, however attractive and charming may be the life of the civil physician, who enters the home of his patient and simply orders the treatment to be carried out by affectionate relatives, the duties and the life work of the soldier surgeon must be completely and entirely different. Not only must he order treatment but he must see his order being carried out in distant stations; not only must he prescribe drugs but he must see that the drugs are there on the battlefield; not only must he direct food to be given but he must see that the food is forthcoming—even in the desert; not only must he instruct the orderly but he must see that the orderly obeys him as a soldier. All this differentiates him largely from the civil physician working in peace, trained, it may be, in the same medical college. The lives of the two men are absolutely divergent, and the common title of 'doctor' given to each is wholly misleading in the case of a military officer. Not all the surgical knowledge of a Brodie and Ferguson will take the convoy of 200 wounded soldiers from Kabul over the snowy Pass of Lataband for 200 miles to Peshawar. Not all the medical science of a Jenner or a Watson will insure that in the great base hospitals of war every one of the hundreds of patients is seen and carefully attended to, cleansed, fed and cared for on a hostile shore, and shipped for England in all the confusion and turmoil and oftentimes the selfishness of the base of an army in the field. My dear civil brother physician, it is true I was at the same school of medicine with you; yes, but it never taught me to work in the Soudan square and to see that others worked under me, until every man that fell was not only dressed, but fed and cared for, and carried for miles off the field to a far-away tent hospital. In the crowded war transport, in the Indian camp, in the torrid heat of the Suakim deserts, or in the steaming tropical depths of Malayan forests, I do other, soldier's, work for England than you who serve her in a civil capacity at home, and I do it far away and alone, often unaided and far from sympathetic help. Energy, courage, self-sacrifice, devotion to duty, the soldier's heart, discipline to the yielding of one's life under fire—all these are needed. Life with the soldier on the choking march in the burning Soudan, in the drifting snows and freezing winds of Kabul tablelands, the burning tents in the wide, bare Indian plain—all these things shared with the soldier

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separate me from you with whom I learned the physician's art. It is true I am a doctor in the civil sense, and glory in the fact, but I am a soldier of England too, and for her and her people I have given all the devotion and all the self-sacrifice she demands of her soldier sons, and although every man in the army denied me the title of soldier—from the chief at the head to the last recruit that joined yesterday—I reply you are wrong, and you are wrong because you do not know and you do not understand; and I appeal from the army in its prejudice to England and our people to do justice between us, and to say if she denies me the title I have so justly and, I hope, so devotedly earned in her cause; for the army does not belong to the army, but to the nation that lies behind it."

Colonel Bache, commenting on this article, wrote: "The whole argument is an almost passionate appeal from an officer who has lived under a more systematized medical field organization than our own, for a more precise military treatment of the subject and for the distinct military significance of the medical officer."

With the stupendous influx into our Army of medical men necessarily imbued with the ideas of the civil practitioner, the important fact that the medical officer, within his specialty, must be quite as much a soldier as any other officer, may be lost sight of in the beginning, unless emphasized; and if it is lost sight of, the results will be inefficient until, through experience, this fact becomes to be appreciated.

THE COUNCIL OF NATIONAL DEFENSE COMPLIMENTS THE MILITARY SURGEON

THE MILITARY SURGEON greatly appreciates the following compliment paid it by the editorial committee of the General Medical Board of the Council of National Defense. "The committee would call the attention of the Medical Officers Reserve Corps to the importance of the educational opportunities offered by THE MILITARY SURGEON the journal of the Association of Military Surgeons, U. S., which has undertaken the regular publication of important material that recently has been secured by observers from the Medical Corps of the United States Army abroad. This excellent magazine will supply the latest information on sanitation and military medicine and surgery to the newly enrolled members of the Medical Corps."

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By James Duncan Gatewood, M.D., Instructor in Naval Hygiene, U. S. Naval Hospital, Washington, D. C. Prepared under the direction of the Bureau of Medicine and Surgery and Published by Permission of the Navy Department. 113 Illustrations, 8 Colored Plates, 779 Pages. Cloth, $6.00 Postpaid.

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The Henry S. Wellcome Prizes

Competition open to all medical officers and former medical officers of the Army, Navy, Public Health Service, Organized Militia, U. S. Volunteers, and of the Reserves of the United States:

PRIZE FIRST: A GOLD MEDAL AND $300
PRIZE SECOND: A SILVER MEDAL AND $200

Competition for 1917 will be based on essays on prescribed subjects as follows:

For Prize First.—*Prisoners of War: Organization, Construction and Administration of Prison Camps, with Reference to the Maintenance of the Health of the Prisoners of War and the Protection of the Health of the Surrounding Communities.*
For Prize Second.—*Sick and Injured Soldiers and Sailors: Their Distribution, Care and Disposition outside the Military Zones, in Time of War.*

Each competitor must furnish five copies of his competitive essay. Essays must not be signed with the true name of the writer, but are to be identified by a *nom de plume* or distinctive device. They must be forwarded to the Secretary of the Association of Military Surgeons of the United States, Army Medical Museum, Washington, D. C., so as to arrive at a date not later than **September 15, 1917,** and be accompanied by a sealed envelope marked on the outside with the fictitious name or device assumed by the writer and enclosing his true name, title and address. Essays must contain not less than 5,000 nor more than 20,000 words, exclusive of tables. The envelopes accompanying the winning essays will be opened at the annual, or other meeting, by the president, and the names of the successful contestants announced by him. The winning essays become the property of the Association and will be published in THE MILITARY SURGEON. The writers of the essays receiving "first honorable mention" will be awarded life membership in the Association of Military Surgeons, U. S.

The Gorgas Medal

Competition open to all medical officers and former medical officers of the Army and Organized Militia, including the Medical Reserve Corps and medical officers of the Officers Reserve.

A gold medal will be presented annually for the best paper showing original research in preventive medicine. Each paper must be signed by a fictitious name, or device, and accompanied by a sealed envelope marked with the same name or device, containing the name, rank, and address of the writer. The first competition will close **October 1, 1917.** Essays (five copies) are to be sent to the editor of THE MILITARY SURGEON and the successful essay will be published in that journal.

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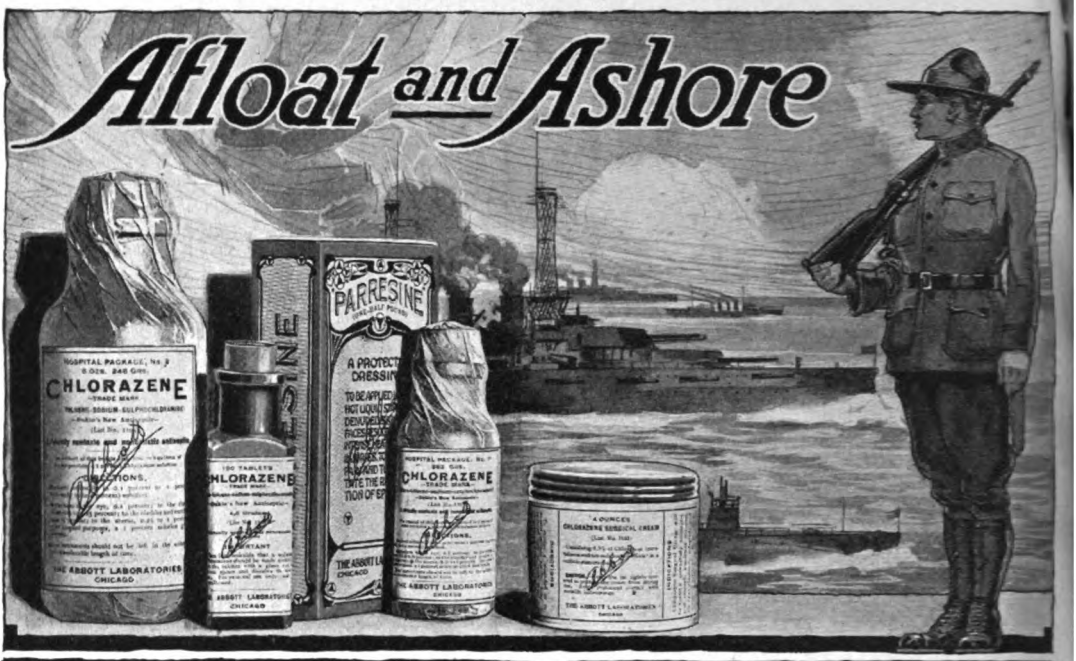

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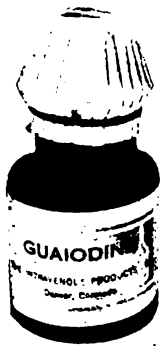

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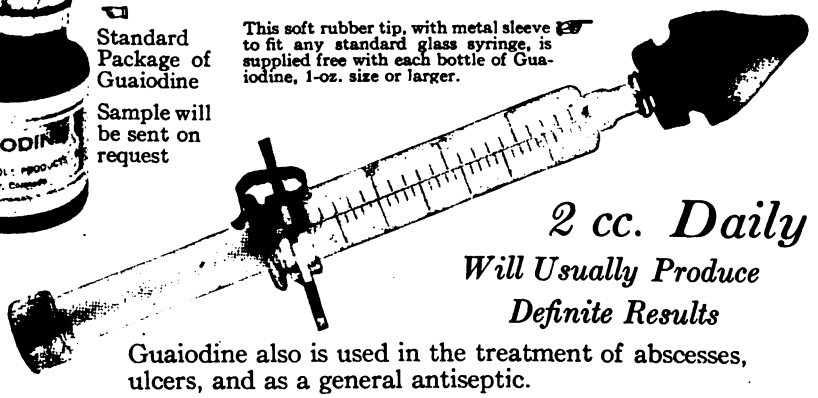

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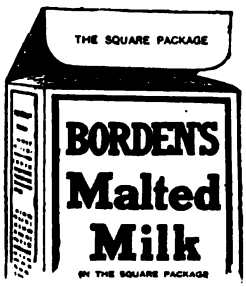

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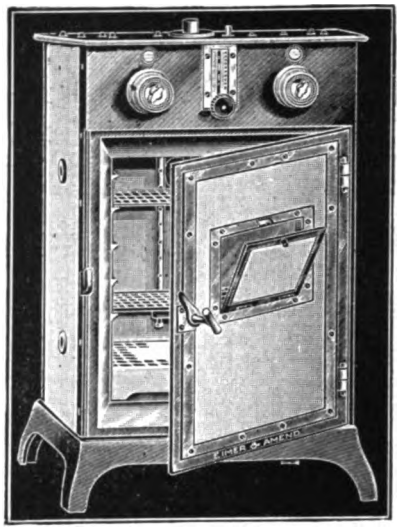

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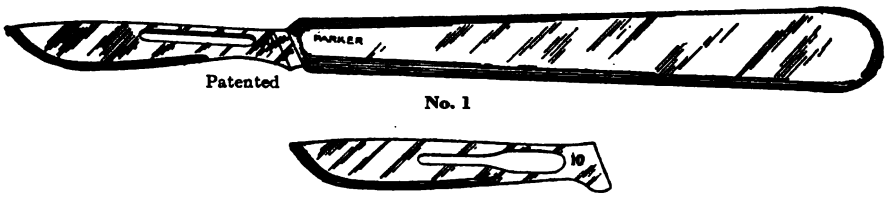

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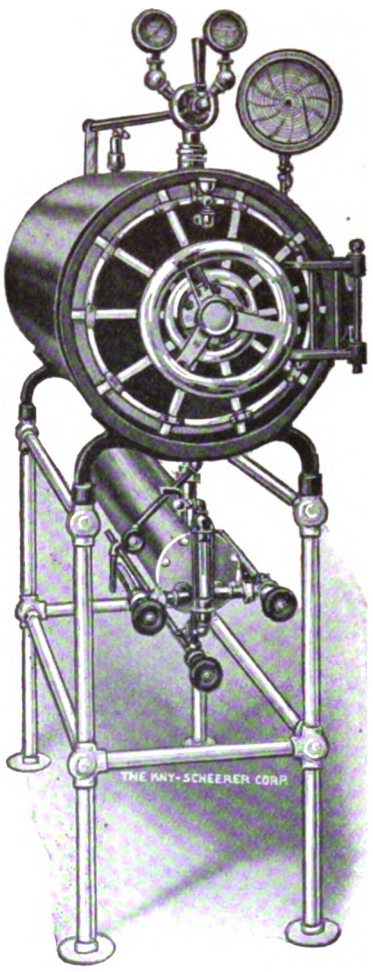

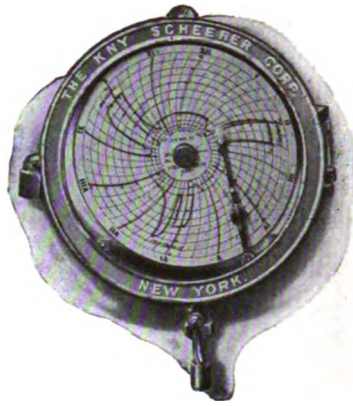

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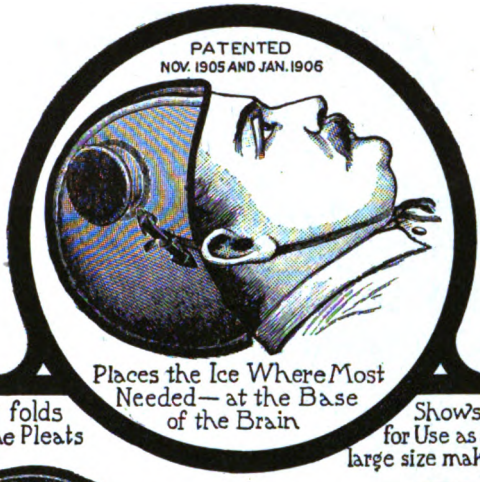

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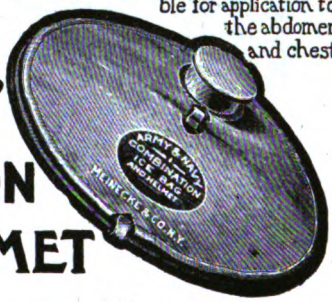

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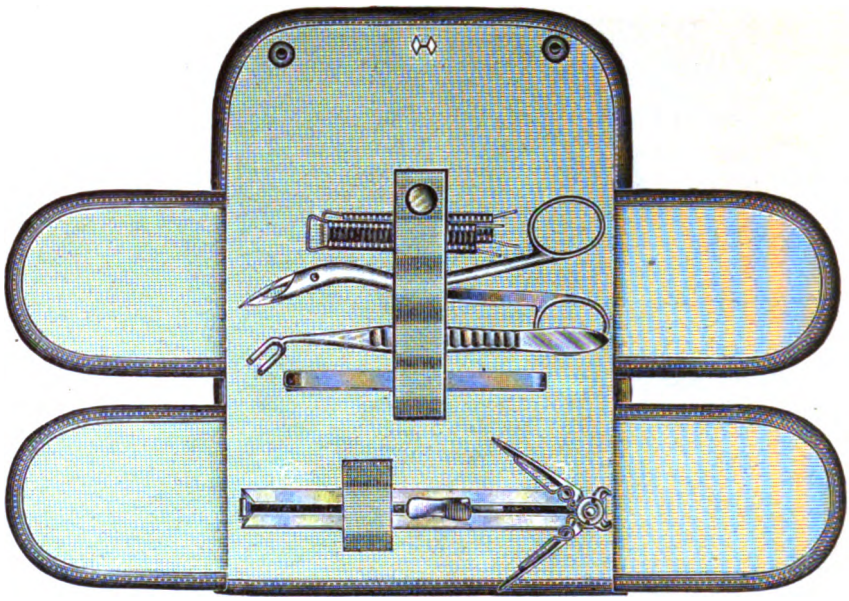

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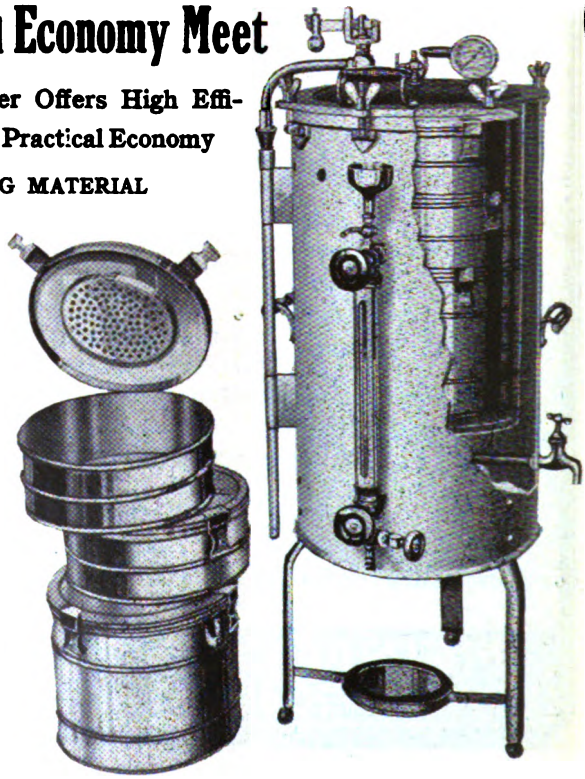

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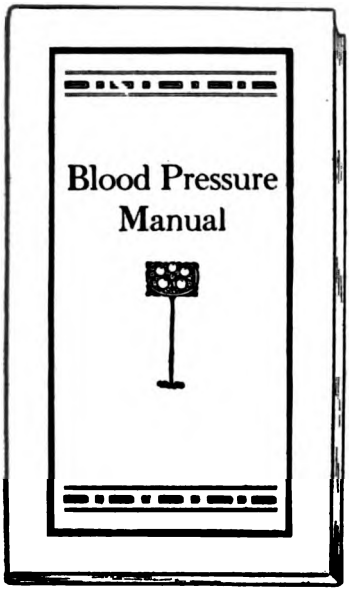

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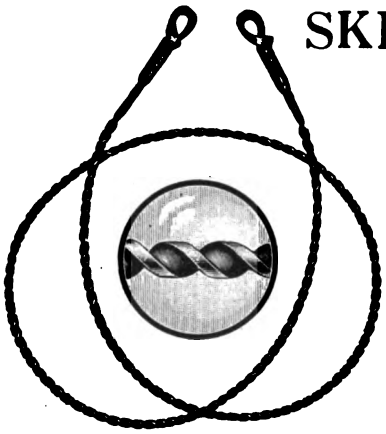

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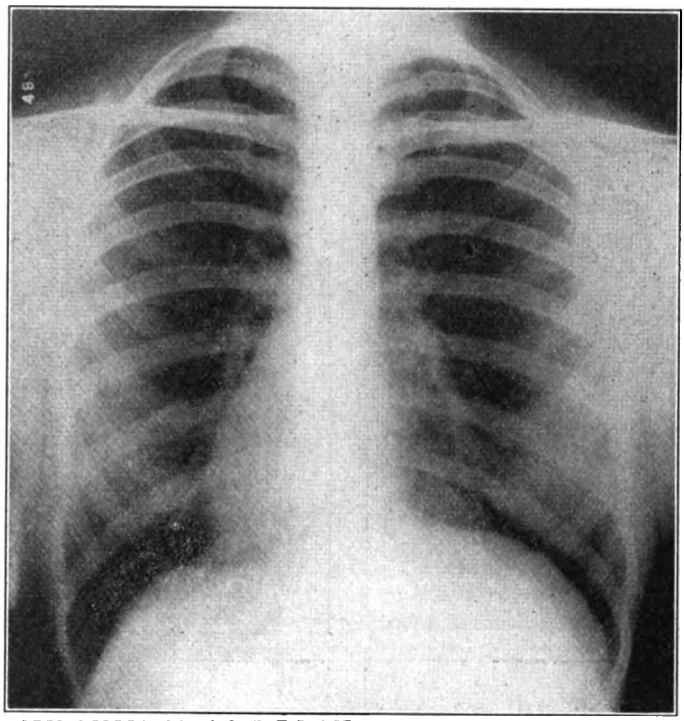

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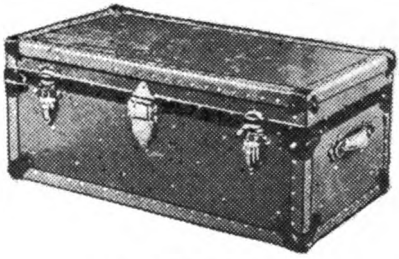

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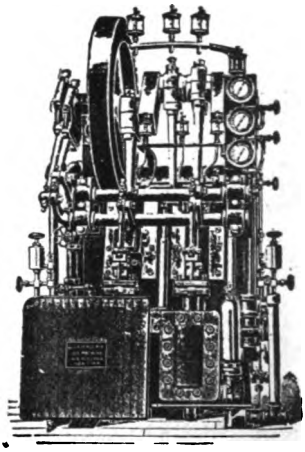

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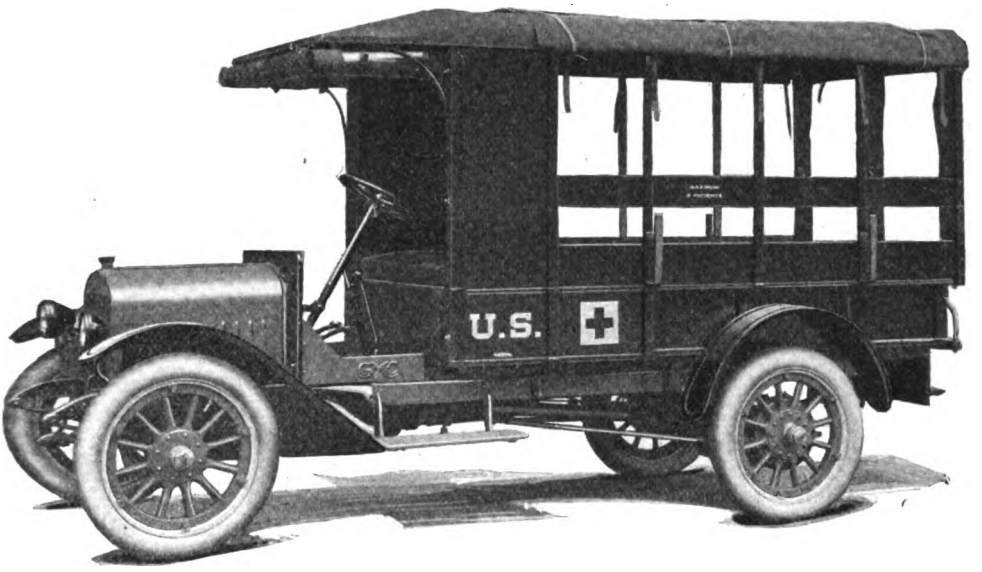

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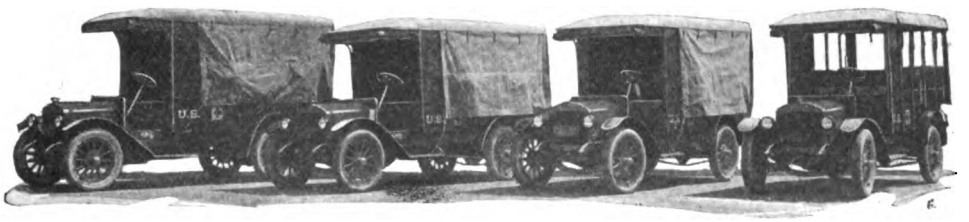

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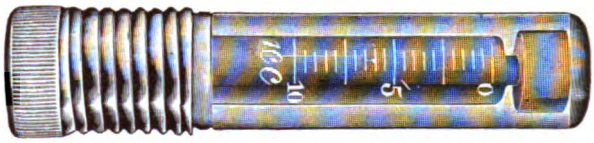

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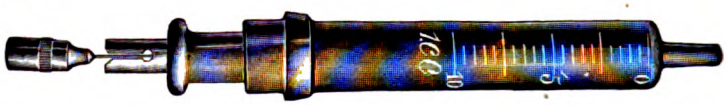

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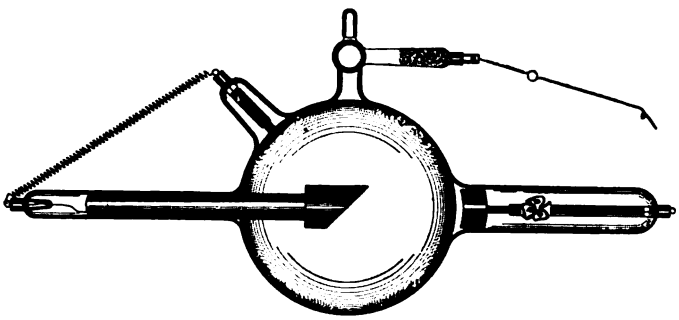

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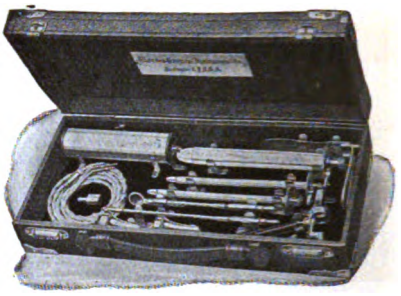

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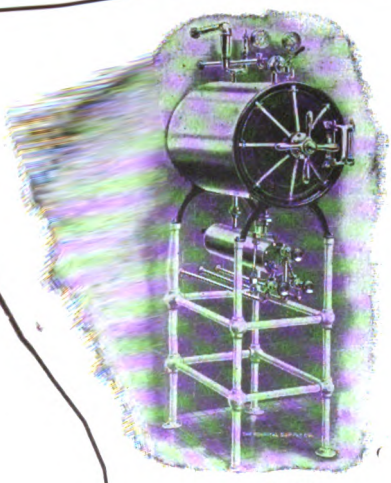

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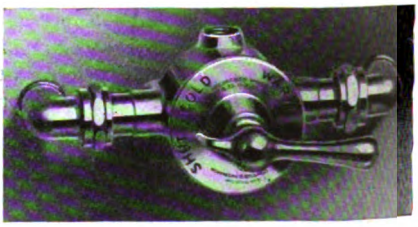

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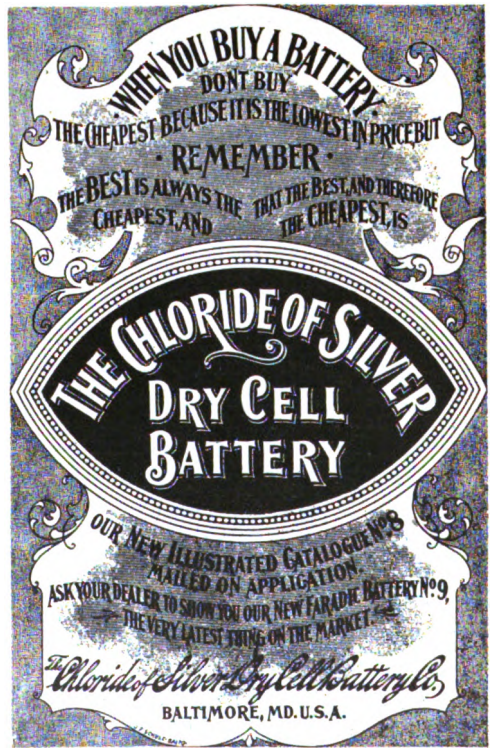
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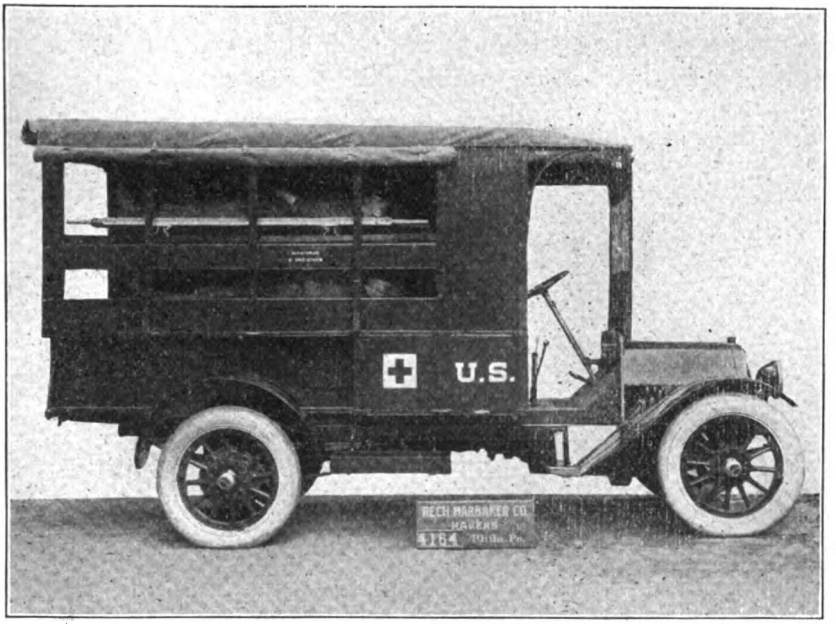

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